RECORD OF DECISION

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

HELENA CHEMICAL COMPANY SITE

TAMPA, HILLSBOROUGH COUNTY, FLORIDA

PREPARED BY

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION 4

ATLANTA, GEORGIA

RECORD OF DECISION
DECLARATION

SITE NAME AND LOCATION

Helena Chemical Company Superfund Site
Tampa, Hillsborough County, Florida

STATEMENT OF BASIS AND PURPOSE

This decision document (Record of Decision), presents the selected remedial action for the Helena Chemical Company Superfund Site, Tampa, Hillsborough County, Florida, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. § 9601 et seq., and to the extent practicable, the National Contingency Plan (NCP), 40 CFR Part 300.

This decision is based on the administrative record for the Helena Chemical Company Superfund Site. The State of Florida, as represented by the Florida Department of Environmental Protection (FDEP), has reviewed the reports which are included in the Administrative Record for the Helena Chemical Company Site. In accordance with 40 CFR § 300.430, as the support agency, FDEP has provided EPA with input during the remedial selection process. Although FDEP has not indicated an objection to the overall approach of the selected remedy, FDEP is unwilling to concur with this ROD because FDEP disputes the remediation goal selected for 4,4-DDT in ground water.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Helena Chemical Company Superfund Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This action is the first and final action planned for the Site. This action addresses soil, sediment, and ground water contamination at the Site and calls for the implementation of response measures which will protect human health and the environment. The selected remedy includes biological treatment (i.e., bioremediation) of pesticides and other site related contaminants located in surface soils and sediments to levels appropriate for future industrial use of the Site. In addition, the selected remedy includes ground water recovery and treatment to remove pesticides and other site related contaminants. Because bioremediation is an innovative treatment technology for pesticide removal, low temperature thermal treatment of contaminated soils/sediments is being proposed as a contingency remedy in the event that bioremediation is not effective in treatability studies.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy satisfies the statutory preference for treatment as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Because this remedy addresses surface soils (0 to 2 feet deep), hazardous substances may remain onsite in sub-surface soils. A review will be conducted within five years after commencement of the remedial action and reviews will continue to be conducted at five-year intervals to ensure that the remedy continues to provide adequate protection of human health and the environment.

Richard D. Green 7 MAY 96

RICHARD D. GREEN DATE
ACTING DIRECTOR
WASTE MANAGEMENT DIVISION

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1.0 SITE LOCATION AND DESCRIPTION

The Helena Chemical Company (HCC) Tampa facility is located at 2405 North 71st Street in Tampa, Hillsborough County, Florida, approximately 0.5 mile west of the Tampa Bypass Canal (Figure 1-1). The Site is in the Orient Park Industrial area, the eastern most section of Tampa. The main operating portion of the facility covers approximately 8 acres and is bounded on the north by 14th Avenue, on the east by Orient Park Road, on the south by an active railway line (CSX Railroad), and on the west by 71st Street (Figure 1-1). In addition to this property, HCC also owns a 3 acre vacant lot immediately west of 71st Street and southwest and west of the facility proper.

The operating facility includes an office, laboratory, bath house, product storage warehouse, liquid processing and repackaging warehouse, and several above-ground storage tanks currently used for emulsifiers, sun oil, and fuel oil (see Figure 1-2). A concrete surface-drainage swale in the east-central portion of the site empties directly into an unlined stormwater runoff retention pond located in the extreme southeast corner of the site. A spillway at the southeastern corner of the retention pond overflows into a drainage ditch parallel to the CSX railroad. Immediately north of the retention pond, an elevated area approximately 100′ x 100′ marks the location of an active septic tank drain field.

The center of the facility is paved with concrete, while the loading dock area west of the storage warehouse is covered with asphalt. The remainder of the site is grassy, with several large oak trees on the north side of the property. The adjacent vacant lot is open, with thin undergrowth and several oak trees. The majority of the site, including the vacant lot, is fenced. The terrain is relatively flat and gradually slopes to the south and southeast.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

HCC was built in 1929 as a chemical plant for the production of sulfur and was owned and operated by Flag Sulfur Company. Details of operations are not clearly described in the available records. According to the previous and current facility managers, Flag Sulfur manufactured wettable and dusting sulfur and formulated pesticides, herbicides, fungicides, and fertilizers; however, no historical records are available regarding the specific products formulated during Flag's occupancy.

HCC purchased the facility from Flag Sulfur Company, owned by the Duval Corp., in 1967. From 1967 to 1981, HCC produced wettable dusting sulfur and formulated pesticides, herbicides, fungicides, and liquid and dry fertilizers. The formulation process for liquid products would consist of mixing a technical (pure) chemical (such as toxaphene) with various solvents (such as xylene) and surfactant and/or emulsifiers (such as Solar 40 and Polyfon O) in above-ground mixing vessels in the

FIGURE 1-1. SITE LOCATION MAP

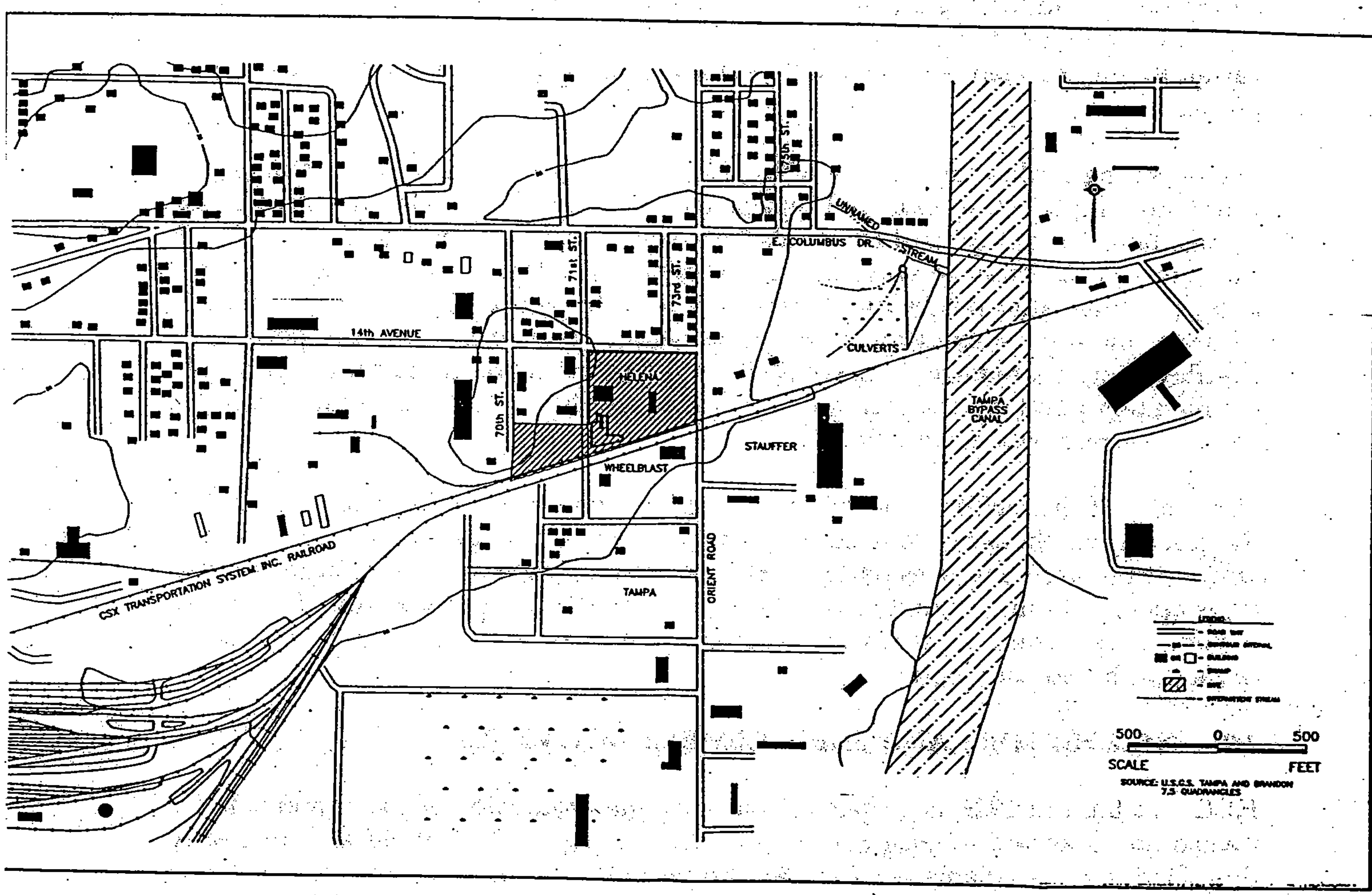
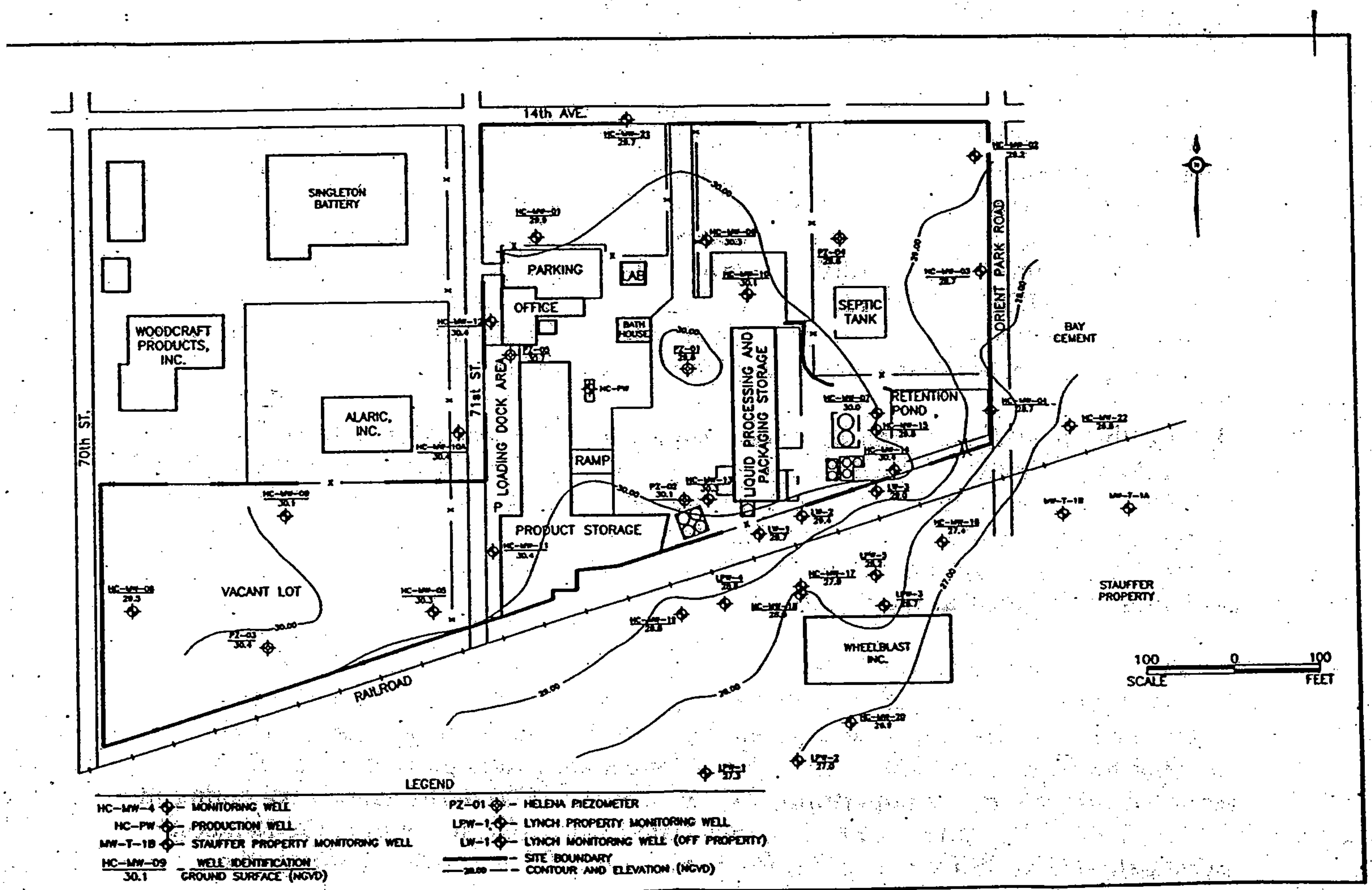


FIGURE 1-2. TOPOGRAPHIC MAP



Liquid Processing and Packaging LPP Storage Building. Dry products were formulated in the east end of the Product Storage Building using a Raymond Mill for grinding and a set of ribbon blenders for mixing. HCC would then package the finished product for resale. No technical product was ever manufactured by HCC at the Tampa facility; rather, HCC purchased the technical product and added solvent, emulsifiers, and/or surfactant to give the finished product certain characteristics required for various applications and strengths.

In 1976, HCC stopped processing sulfur products, and in 1980, the formulation of dry fertilizers was discontinued at the facility. In 1981, HCC moved the pesticide, herbicide, and fungicide formulation operation to an HCC Georgia office. Since 1981, HCC has formulated insecticidal petroleum oil (a 70-viscosity paraffin-based oil with an emulsifier additive), and liquid fertilizers. In addition to products produced at the HCC facility, numerous agricultural products are stored in the warehouse prior to distribution to HCC's 10 Florida sales offices. The agricultural products processed, formulated, or repackaged at the HCC facility from 1967 to the present are referenced in Section 3 of the 1995 Remedial Investigation (RI) report.

Historically, most agricultural chemical formulation occurred in the Liquid Processing and Packaging Storage Building (Figure 1-2), which houses six above-ground tanks used for liquid agricultural product formulation. Five are currently in use; the sixth (a gas trap tank used for nitrate fertilizer formulation) is no longer used. Although not currently used, xylene was previously the most commonly used carrier in pesticides formulated at the facility .

In 1984, FDEP inspected the Helena Site and required quarterly monitoring of the surficial aquifer. From 1988 to 1990, EPA investigated this site and found pesticide contamination in the on-site soil, sediments, and surficial aquifer. Based on the potential for human exposure via ingestion of contaminated ground water, EPA proposed this Site to the Superfund NPL in February 1992 and finalized the listing in October 1992. EPA, under CERCLA, negotiated with HCC to conduct the Remedial Investigation/Feasibility Study (RI/FS) at the Site. HCC agreed to perform the RI/FS. The primary focus of the investigation has been to determine the nature, magnitude, and extent of contamination, evaluate potential risks to human health and the environment, and evaluate potential cleanup alternatives. Neither HCC or EPA have undertaken any Site cleanup to date. Studies conducted by HCC have documented extensive soil contamination by pesticides related to former operations by HCC and its predecessors. Ground water contamination of the surficial and Floridan aquifers also exists, but to a much lesser extent. The degree of contamination with respect to potential risks, compliance with applicable regulatory standards, and potential for future contamination is summarized in the following sections.

Florida Department of Health and Rehabilitative Services (FHRS), in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR), prepared a public health assessment in September 1993. In that report, FHRS expressed concern for on-site worker contact with contaminated soils and exposure to sediments and ground water. FHRS made several recommendations that additional data should be collected. The RI and Baseline Risk Assessment (BRA) addressed these issues.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

All basic requirements for public participation under CERCLA §§ 113(k)(2)(B)(i-v) and 117 were met in the remedy selection process. A Fact Sheet on the Site was first distributed in September 1993. Since that time, a community relations plan was further developed and implemented at the Site. An information repository was established in July 1995, at the Tampa Campus Library of the University of South Florida, at 4202 East Fowler Avenue, Tampa, Florida.

The Remedial Investigation/Feasibility Study Reports, the Baseline Risk Assessment Report, and Proposed Plan for the HCC Site were released to the public in July 1995. These documents are incorporated in the Administrative Record for the Site. A copy of the Administrative Record, upon which the remedy is based, is located at the Information Repository. In addition, the Administrative Record and the Site (project) files are available for review at the EPA Region 4 offices in Atlanta, Georgia. Notices of availability of these documents were published in the *Tampa Tribune* on July 20, 23, 26, and 27, 1995.

On July 27, 1995, EPA presented its preferred remedy for the Helena Chemical Company Superfund Site during a public meeting at the Kenley Park Recreation Center, 1301 North 66th Street, Tampa, Florida. At this meeting, representatives of EPA answered questions about sampling at the Site and the remedial alternatives under consideration. A transcript of the meeting was prepared and is available at the Information Repositories.

A public comment period was held from July 20, 1995 through September 23, 1995. EPA's responses to comments which were received during the comment period are contained in Appendix A of this Record of Decision.

4.0 SCOPE AND ROLE OF RESPONSE ACTION

The purpose of the remedial alternative selected in this ROD is to reduce current and future risks at this Site. The remedial action for soil will remove current and future health threats posed by contaminated surface soil (i.e., soil from 0 to 2 feet below land surface (bls)) and will prevent leaching of the soil contaminants to ground water. The ground water remedial action will reduce future risks posed by potential usage of contaminated ground water. It also will serve to remove the threat to surface water by reducing the concentrations of surficial aquifer contaminants reaching nearby surface water systems. This is the only ROD contemplated for this Site.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 Physiography and Topography

The HCC site is located in an area bordering Six Mile Creek and the Tampa Bypass Canal. The Site topography is relatively flat, with elevations ranging from 28.7 to 30.7 feet above mean sea level (Figure 2). The land surface generally slopes south and southeasterly toward the railroad and the Stauffer facility located along the eastern bank of the Tampa Bypass Canal. Aerial photographic analyses also suggest that the general topography of HCC and the surrounding area has sloped south and southeast toward Six Mile Creek (prior to the Tampa Bypass Canal construction) and south and southeast toward the Tampa Bypass Canal since construction. Flow in the canal is to the south and west for approximately 3.5 miles, where it enters McKay Bay. At the 22nd Street Causeway, flow from McKay Bay enters East Bay, which discharges into Hillsborough Bay approximately 7 miles downstream from the HCC facility. The Tampa Bypass Canal is classified as a Class III Surface Water by Florida Department of Environmental Protection.

5.2 Geology/Hydrogeology

At the HCC site, a thin veneer (3 to 6 inches) of surface soil and sediments covers fine to medium-grained sands, making up the surficial deposits. These deposits are underlain by a stiff intermediate clay unit (Intermediate Confining Unit) that was encountered in every soil boring drilled to sufficient depth at the property. The stiff clays encountered at the Site appear to form a confining unit between the overlying surficial aquifer and the underlying of sandy, clayey, poorly consolidated limestones that grade into more indurated limestones (see Figures 5-1 and 5-2).

The surficial deposits extend to approximately 11 feet below land surface (bls) and are primarily unconsolidated, brown, fine-grained sand with organic matter. Traces of clay, silt, medium-grained sand, and shells are common in the fine-grained sand matrix. The surficial deposits form a sharp contact with the underlying Intermediate Confining Unit. The ground water level was observed at a depth varying from 2 to 4 feel bls between April 1993 and July 1994. Specific conductivity values measured in surficial aquifer wells were inversely proportional to and correlated with pH values. As shown in Figure 5-3, the lowest pH values (1.8 pH units), and correspondingly, the highest conductivity values (11,750 ms/cm), are concentrated near the former sulfur pit.

FIGURE 5-1. SITE MONITORING WELLS AND PIEZOMETERS

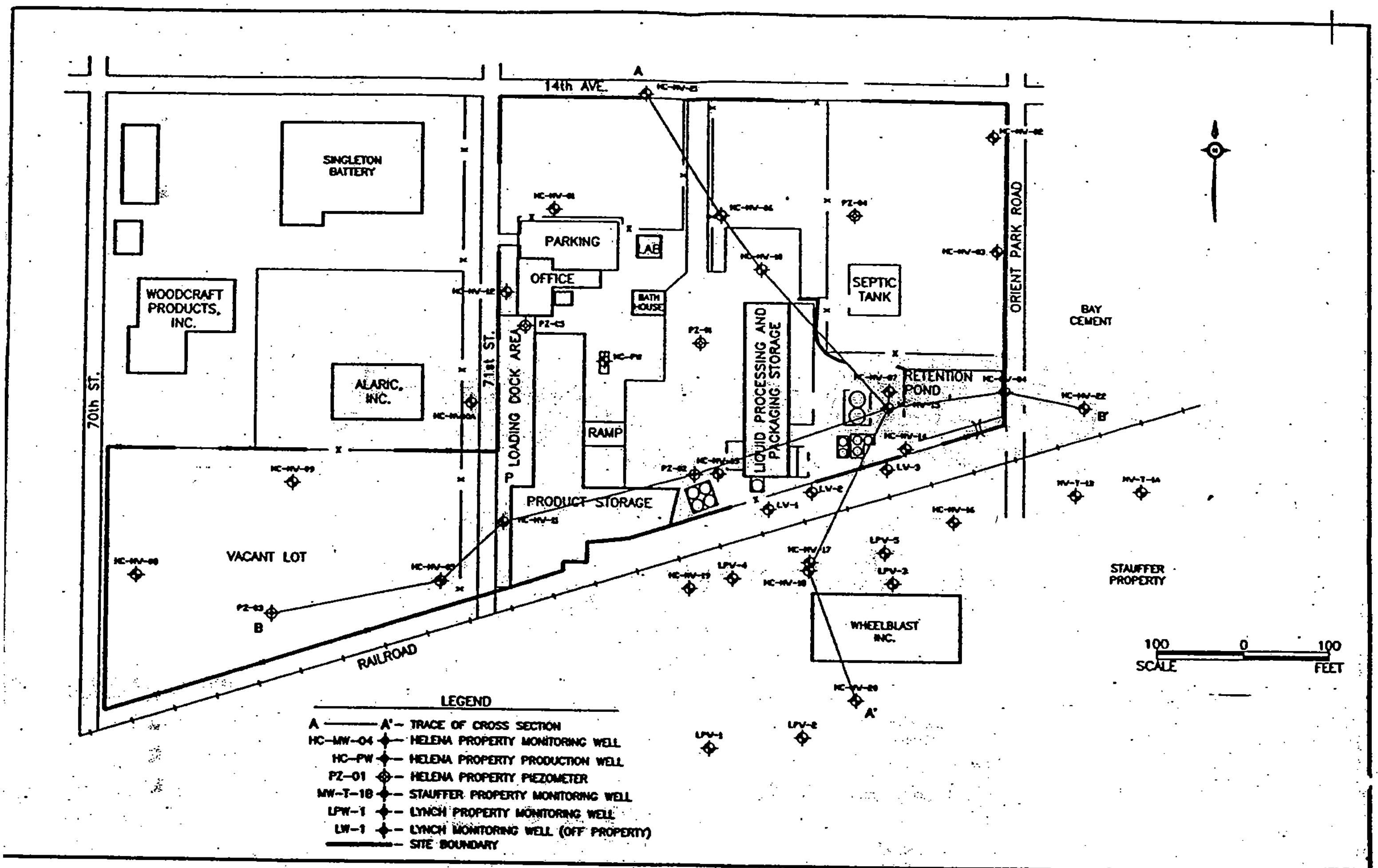


FIGURE 5-2. NORTH-SOUTH STRATIGRAPHIC CROSS SECTION

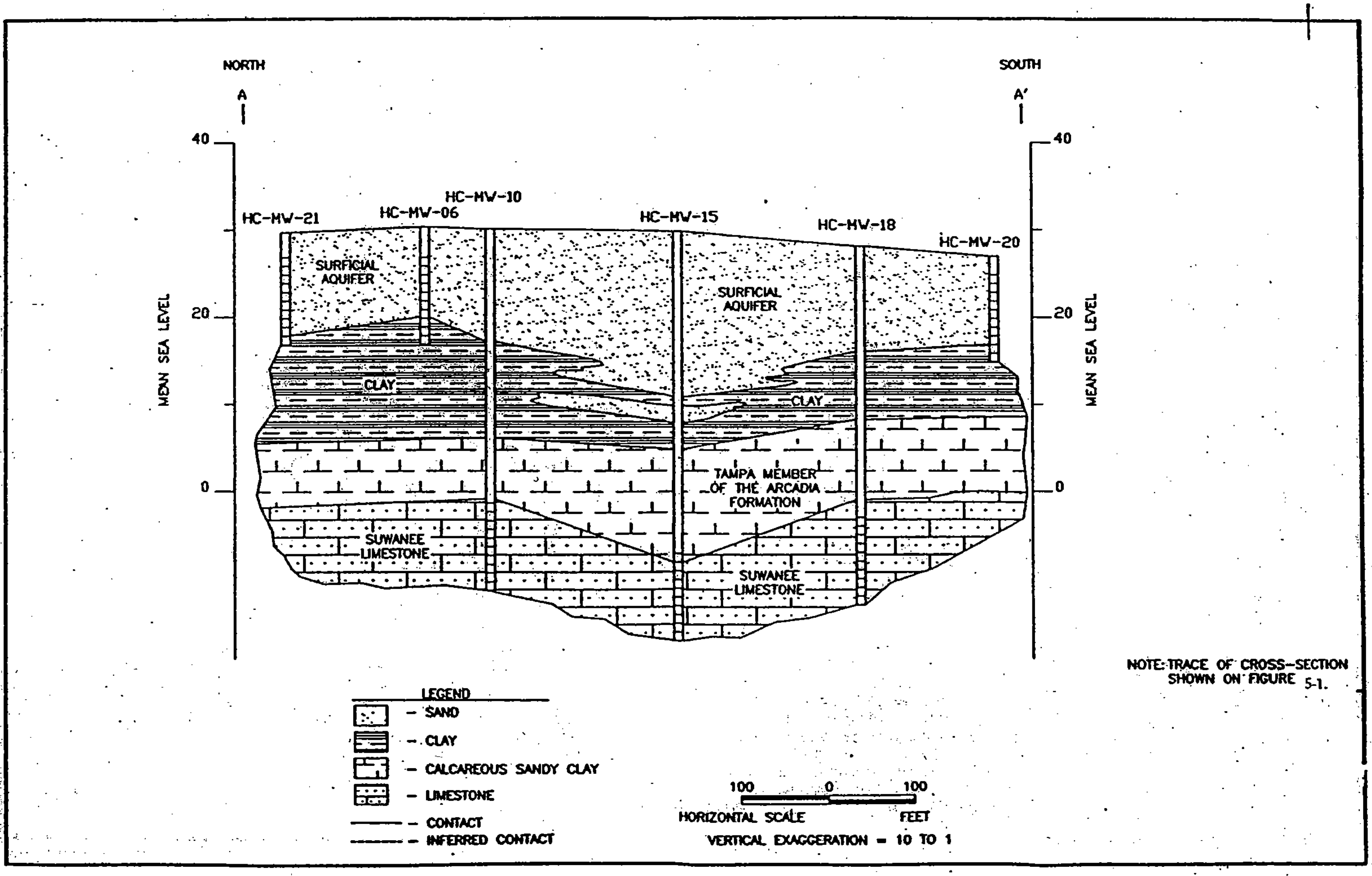
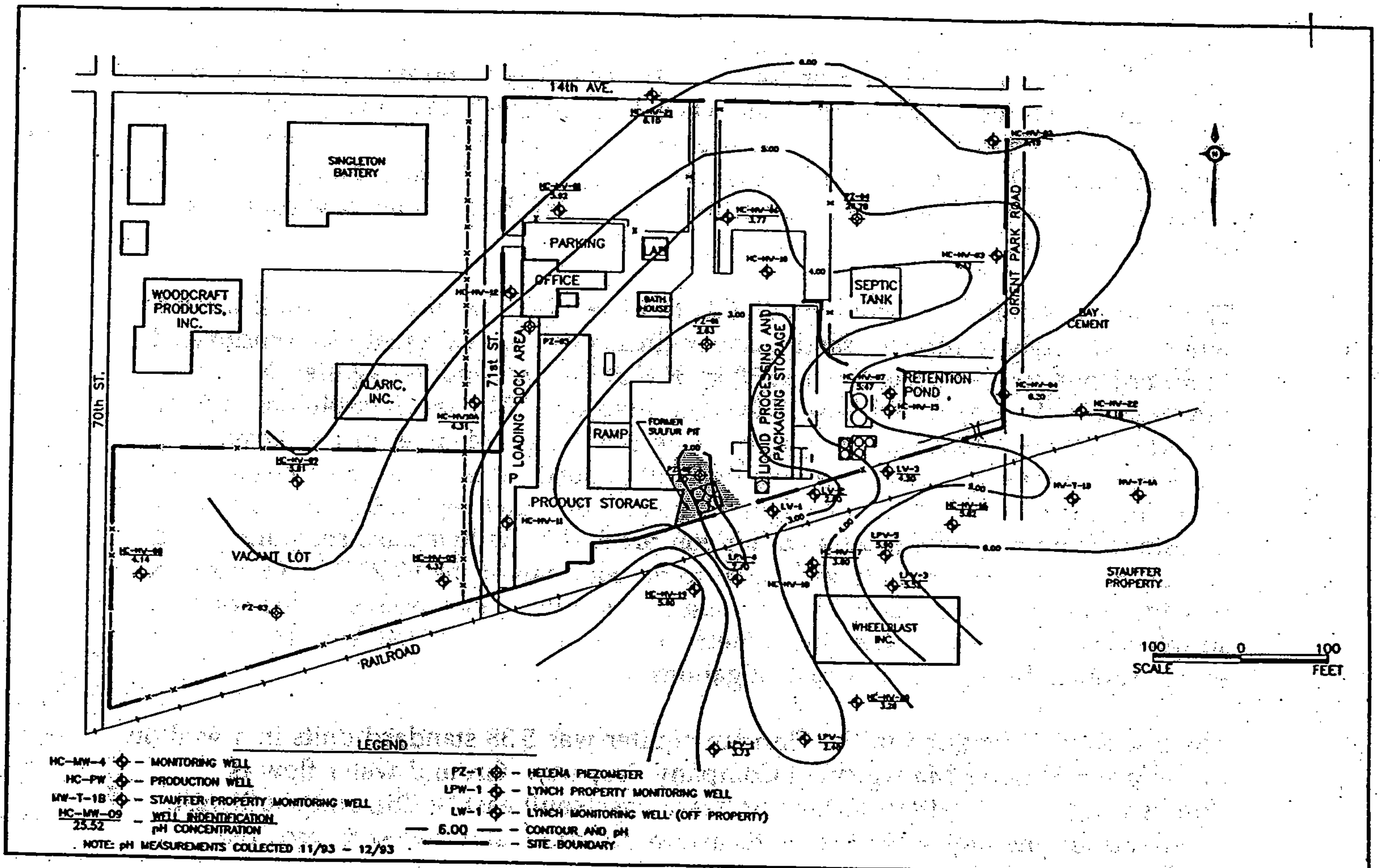


FIGURE 5-3. pH MAP SURFICIAL AQUIFER



The intermediate clay unit extends approximately 11 feet bls and is predominantly stiff blue-green and tan clay with 5 to 15 percent quartz sand. This unit was encountered in every boring drilled to sufficient depth during the RI. The clay exhibits low hydraulic permeability, forming the Intermediate Confining Unit between ground water in the upper surficial aquifer and lower Floridan Aquifer. The lowest elevations in the clay surface are near the office, loading dock area, lab, and bath house.

Laboratory analysis of Shelby tube samples indicates permeabilities ranging from 1.6×10^{-7} to 2.9×10^{-10}. The thickness of the Intermediate Confining Unit rages from approximately 8 feet south of HCC on Wheel-blast property to approximately 25 feet in the central and east portions of the property. The Intermediate Confining Unit is approximately 10 feet thicker in the east central portion of the site than it is near the office, and 17 feet thicker in the east central portion of the site than it is south on adjacent property.

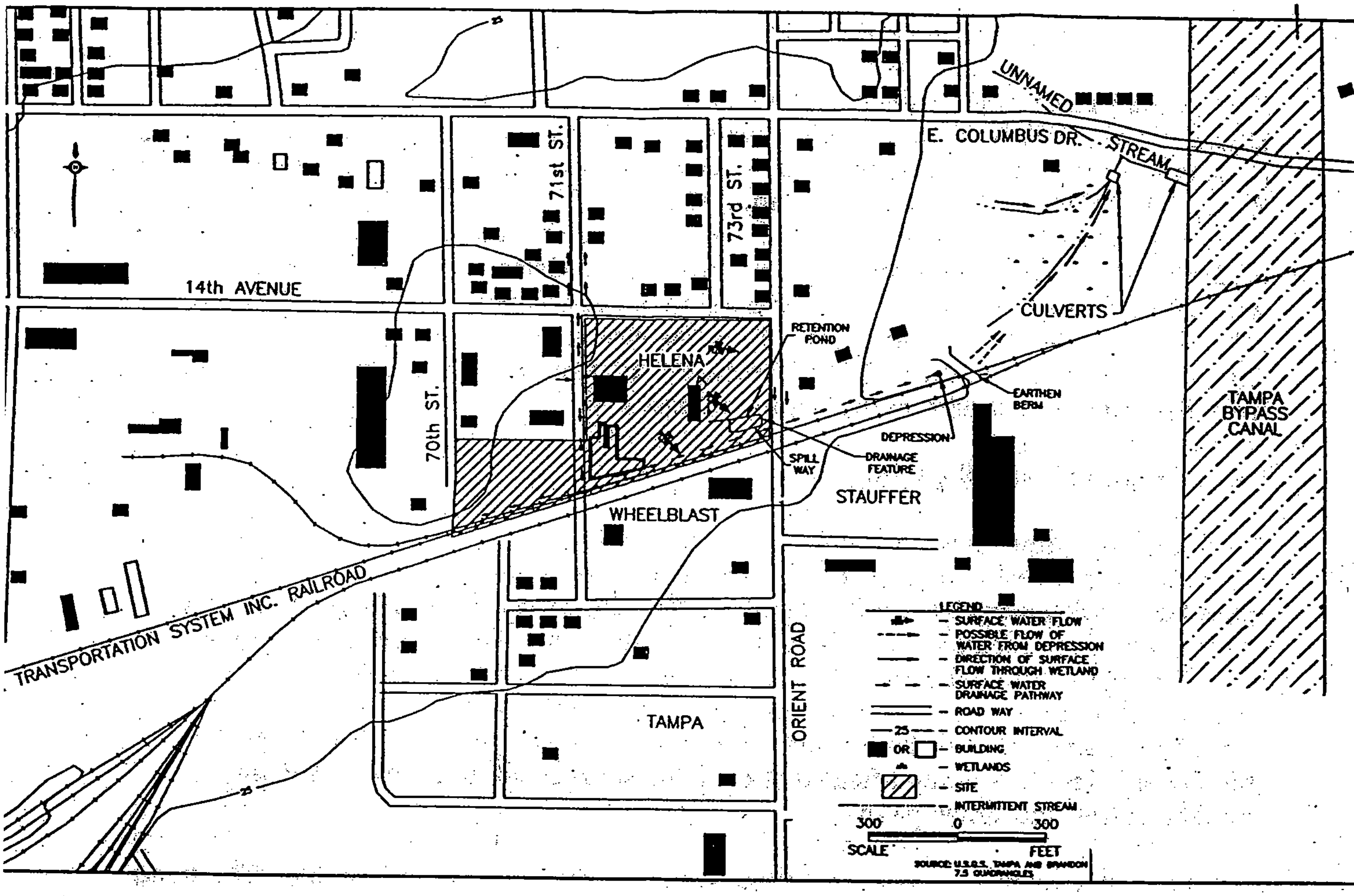
The Floridan Aquifer is encountered at 22 to 28 feet bls, the upper section is a tan to white moderately indurated, sandy, clayey limestone. An extremely well-indurated limestone horizon is encountered at 30 to 34 feet bls. A confined aquifer is developed in the upper and lower Floridan limestone. The less consolidated upper material of the Floridan has been assigned to the Tampa Member of the Arcadia Formation. Limestone above the well-indurated horizon has not been considered part of the Floridan. The lack of any significant confining unit separating the upper limestone from the more indurated horizon precludes the hydraulic separation of the two units. One water supply well open to the Floridan at the HCC site was used to provide water for pesticide manufacturing and formulation processes. The water supply well, which is 6 inches in diameter and approximately 500 feet deep, was sampled once during previous investigations.

The lowest pH identified in the Floridan aquifer was 5.38 standard units in a well on the adjacent Stauffer Management Company Property. Ground water flow is oriented in a radial pattern to the northeast, east, southeast, south, and southwest. Gradients are the highest in the southeastern direction, and lowest toward the northeast and southwest.

5.3 Surface Water Hydrology

Surface water at the Site is comprised totally of stormwater runoff (see Figure 5-4). The Site is subject to flooding during periods of extended, heavy rainfall. Surface water runoff for the Site as a whole is characterized by a drainage divide at the southern end of 71st Street. From this divide, flow follows two drainage pathways along the north side of the CSX railroad tracks. One path is to the east toward Orient Road and the other path is to the west toward the vacant lot.

FIGURE 5-4. SURFACE WATER DRAINAGE PATHWAYS



Storm water runoff from the central portion of the Site channels into the concrete drainage swale and flows into the onsite retention pond which is designed to hold storm water runoff during a 20-year flood. A spillway at the southeastern corner of the pond allows overflow to drain into a storm water drainage ditch parallel to the railroad.

On the west and north boundaries of the Site, storm water flows to the southwest where it collects in a low area on the southwest end of the vacant lot and to the north via a paired ditch/culvert system along the east and west shoulders of 71st Street. On the east boundary, surface water flow continues south along the ditch parallel to Orient Road. Drainage turns eastward through a culvert under Orient Road, then travels east-northeast for approximately 0.5 mile. The drainage pathway continues through a swale on the north side of the CSX right-of-way. An earthen berm blocks the drainage way 400 to 500 feet east of Orient Road. A small hole, which could be a collapsed culvert or possibly a natural erosional feature, is located at the base of the berm. Water flows from the east side of the berm to an unnamed stream. A culvert cuts through the Tampa Bypass Canal levee and transports water from the unnamed stream to the Tampa Bypass Canal.

5.4 Wildlife/Natural Resources

The HCC Site contains several fields and vacant lots. A flat, grassy, maintained field lies in the northwest corner of the Site. Scattered oak trees (*Quercus sp.*), cabbage palm trees (*Sabal palmetto*), and a camphor tree (*Cinnamomum camphora*), along with other species, are located along the borders of this field. The field is well maintained via frequent watering and mowing. To the east of the northwest field lies a smaller, fenced field which contains the former drum washing area. Within this area are several oak trees. East of the former drum washing area, in the northwest corner of the Site, is a less maintained field that contains several oak trees and a number of cabbage palms and other palms.

A storm water retention pond is located in the southeast corner of the Site. The pond is unlined and retains water to a depth of 2 feet. Overflow drains via a small concrete spillway and a small unlined drainage swale off of the property . The pond is surrounded by grass that is maintained via mowing. The pond banks are grassy, but not maintained, and the grass is about 1 foot tall. This grass extends down into the pond, forming a band of emergent vegetation which grows throughout the pond's littoral areas and into the pond's middle. The pond seems to contain a large amount of algae, but is relatively devoid of animals. During an onsite visit in March 1993, one aquatic beetle was observed in the pond, and there was evidence of some flying insects moving about over the pond's surface. Some small spider webs also were observed attached to the emergent grasses. During an onsite visit in October 1993, small aquatic snails were observed in an open water area where the concrete swale drains into the pond. No evidence was seen of amphibians, tadpoles, or any minnows or fish during any of the visits to the Site during 1993. The pond is part of the runoff control system at the Helena property and does not constitute a significant ecological habitat.

To the west of the facility is a large vacant lot that is not maintained. The lot contains numerous large oak trees, cabbage palm trees, and other palms. The shrubby understory contains shrub verbena (*Latana camara*), asters, beauty-berry (*Callicarpa americana*), bluestem (*Sabal minor*), wax mallow (*Malvaviscus arboreus*), purple nightstand (*Solanum americanum*), muscadine (*Vitis rotundifolia*), catbrier (*Smilax bona-nox*), and a large grove of fishpole bamboo plants (*Phyllostachys aurea*), along with other ruderal plants and weeds.

Immediately downstream of the HCC facility, along the CSX tracks toward the Tampa Bypass Canal, is an extremely disturbed and unnatural habitat containing weedy, ruderal herbs and shrubs. Isolated examples of cattails (*Typha sp.*) and a few small willow trees (*Salix sp.*) grow in and around this area. As the drainage ditch continues to the east, it becomes drier, and contains muddy soil inhabited by mosses and grasses. Vegetation along its course includes cattails, shrub-verbena, rattlebox (*Sesbania drumondi*), silk-tree (*Albizia julibrissin*), and other weeds and shrubs typical of disturbed sites.

The downgradient pathway ends abruptly at the vehicle wrecking yard, where the surface drainage appears to drain into a small vertical drainage depression, possibly a natural erosional feature. It is possible that water draining through this feature exits directly or seeps into an adjacent wetland area. The wetland area is bounded on the north by Broadway Avenue, to the south by the CSX tracks, to the west by the vehicle wrecking yard, and on the east by the bypass canal. A small unnamed stream flows northeast under Broadway Avenue, passing north of the wetland, and discharging into the bypass canal. Surface water from the wetland drains north into this small stream.

The wetland is surrounded by ruderal habitats of one form or another. A maintained grassy buffer surrounds the north, south, and eastern fringe of the wetland. To the northwest, tall oak trees stand between the northern part of the wrecking yard and the wetland, while the southwest border of the wetland diverges into a large population of beardgrass and various ruderal species (red mulberry *[Morus rubra]*, shrub verbena, silk tree, rattlebox, and various escaped ornamentals and introduced species which inhabit disturbed sites). Inside the wetland the approximately 3-meter overstory is dominated by Carolina willows *(Salix caroliniana)*, and sea myrtle *(Baccharis halmifolia)*. The understory includes primerose willow *(Ludwigia peruviana)*, duck potatoe *(Sagittaria sp.)*, pepper vine *(Ampelopsis arborea)*, Virginia creeper *(Parthenocissus quinquefolia)*, was myrtle *(Myrcia cerfira)*, dewberry *(Rubus sp.)*, and other miscellaneous wetland herbs and shrubs.

Animal life was not conspicuous in the wetland. No amphibians or reptiles were noted within the wetland's confines, even when it was flooded. No mammals were noted abiding within the area. Birds were seen in the vicinity of, but not within, the wetlands. Potential threatened or endangered species which were noted to traverse the area under investigation were various shorebirds, which were seen in and around the bypass canal during this investigation. During the remedial investigation, shorebirds were noted one afternoon on the HCC facility itself.

The unnamed stream was rich in aquatic life. Downgradient from the wetland outfall mosquito fish, two small large-mouth bass, and a bluegill panfish were noted. The sediments were rich with benthic invertebrates with a species of freshwater clam, two snail species, and a small crayfish noted.

5.5 Summary of Site Contaminants

5.5.1 Overview

The RI concluded that releases of polychlorinated pesticide compounds, semi-volatiles, inorganics, volatile organic compounds (VOCs), and metals have occurred at the Site. Documented releases on the site property are as follows:

- Pesticide discharges to the ground (i.e., the retention pond) from the former pollution control system and from pesticide washouts;
- An approximate 10,000-gallon xylene release to the ground surface in the area immediately southeast of the aboveground storage tanks and east of the liquid processing and packaging building;
- A release of magnesium and zinc to the ground in the former fertilizer drum washing area north of the liquid processing and packaging storage building; and
- Fugitive emissions from the formulation of dry pesticides.

5.5.2 Substances Detected in Soil

During the RI, soil samples were taken from two intervals. Samples were collected in the interval from ground surface to a depth of 1 foot bls. Samples were collected in the interval between 1 foot bls and the surface of the water table (typically ≈ 3 ft). Over one hundred discrete soil samples (excluding duplicates, quality assurance and split samples) were collected and analyzed for Target Compound List/Target Analyte List (TCL/TAL) analyses. In addition, several dozen composite samples were collected and used to delineate ambient levels of site constituents in soils. Soil sampling locations are shown on Figures 5-5 and 5-6.

FIGURE 5-5. PHASE I & II SOIL AND SEDIMENT SAMPLE LOCATIONS

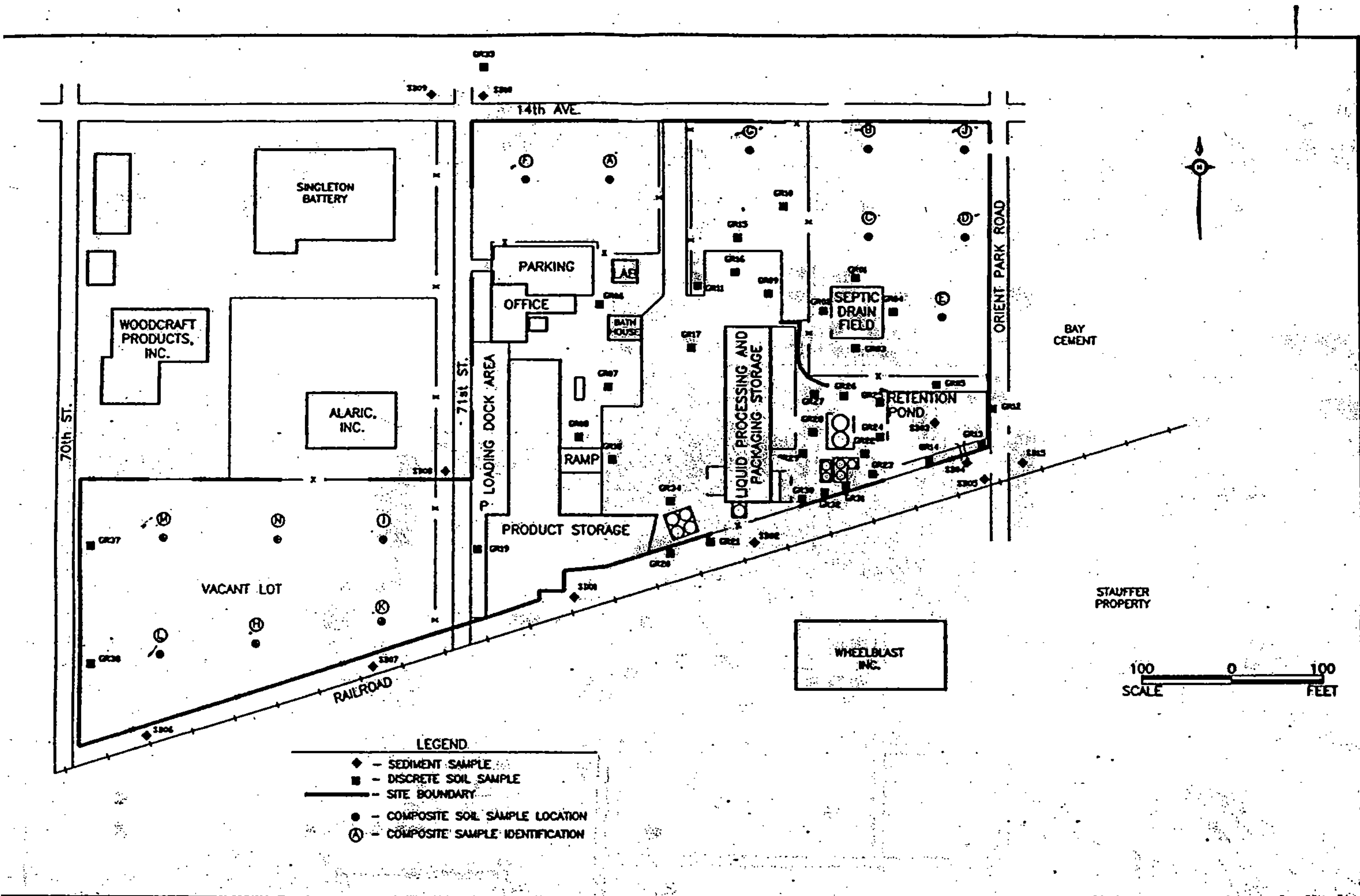
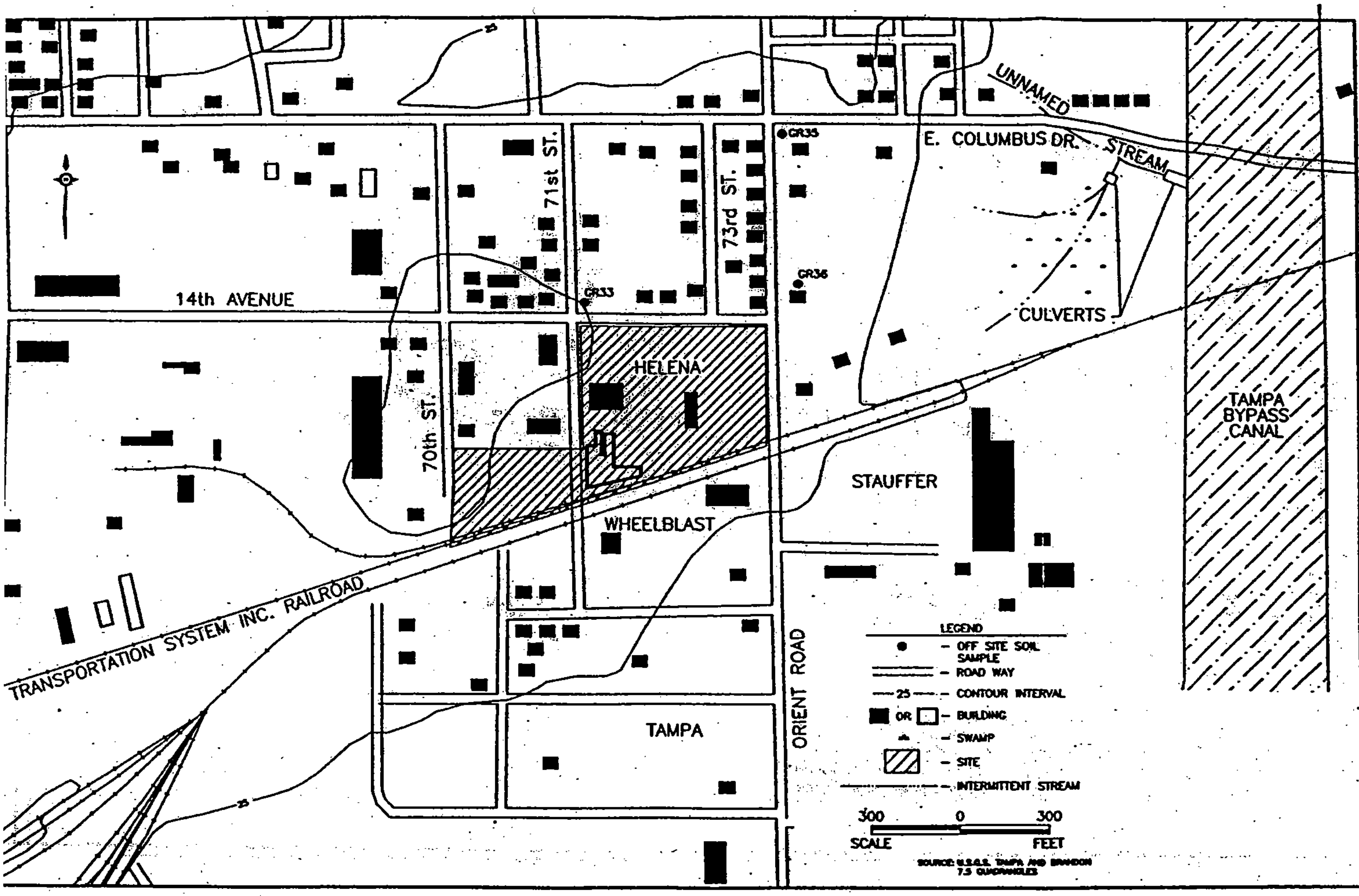


FIGURE 5-6. OFFSITE SOIL SAMPLING LOCATIONS



Total pesticide detections ranged from 1.7 parts per billion (ppb) to 2,665,060 ppb in the upper interval, and from 0.116 ppb to 6,485,900 ppb in the lower interval. The highest total pesticide concentrations in both soil sample intervals were detected in the general vicinity of the retention pond, the former xylene and toxaphene tanks, west of the active bath house, and in the septic drain field. The primary pesticide constituents identified in soil samples were DDT (and its degradation products DDE and DDD), chlordane (alpha and gamma isomers), toxaphene, and BHC (alpha, beta, delta, and gamma [lindane] isomers). The extent of toxaphene soil contamination, both horizontally and vertically, encompasses all areas contaminated by other pesticide constituents. Those components comprising a less significant fraction of the total pesticides identified include aldrin, dieldrin, endosulfan I and II, endosulfan sulfate, endrin, endrin ketone, endrin aldehyde, heptachlor, heptachlor epoxide, and methoxychlor.

Polyaromatic hydrocarbons (PAHs) were the semi-volatiles detected most frequently at the highest concentrations in Site soil samples. The highest PAH concentrations in Site soils were located east of the Product Storage Building, and south of the former xylene and toxaphene storage tanks and emulsifier storage tanks. Detected PAHs included 2-methylnaphthalene, 2-chloronaphthalene, acenaphthalene, fluorene, phenanthrene, anthracene, carbazole, fluoranthene, pyrene, benz(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene, and benzo (g,h,i)perylene. Other semi-volatiles identified less frequently and at lower concentrations included phenol, dibenzofuran, hexachlorobutadiene, hexachlorobenzene, butylbenzylphthalate, and bis(2-ethylhexyl)phthalate.

Ethylbenzene and total xylenes were the volatiles identified most frequently at the highest concentrations in soil sample. Elevated ethylbenzene and xylene concentrations are concentrated along the south central and southeast portions of the Site, in the vicinity of the former xylene storage tanks. Minor fractions of volatiles identified in the soils include carbon tetrachloride, trichloroethene (TCE), tetrachloroethene (PCE), chloroethane, and toluene, and the potential laboratory artifacts acetone, methylene chloride, 2-butanone, and chloroform.

In general, the following metals were identified most frequently at the highest concentrations: aluminum, calcium, iron, magnesium, manganese, and zinc. In the areas of the former sulfur pit and along the CSX railroad tracks, the soil contains residual elemental sulfur.

5.5.3 Substances Detected in Ground Water

During the RI, 31 monitoring wells and two piezometers were sampled at the Helena facility and surrounding properties. Twenty-five of the wells and the two piezometers are screened in the surficial aquifer; six of the wells are screened in the

Floridan aquifer. Ground water sampling locations are shown on Figure 5-7. The results of ground water samples show that chlorinated pesticides, PAHs, phenols, and VOCs have reached the onsite and adjacent surficial monitoring wells. Select pesticides, PAHs, phenols, and VOCs also were present in four of the six Floridan Aquifer monitoring wells.

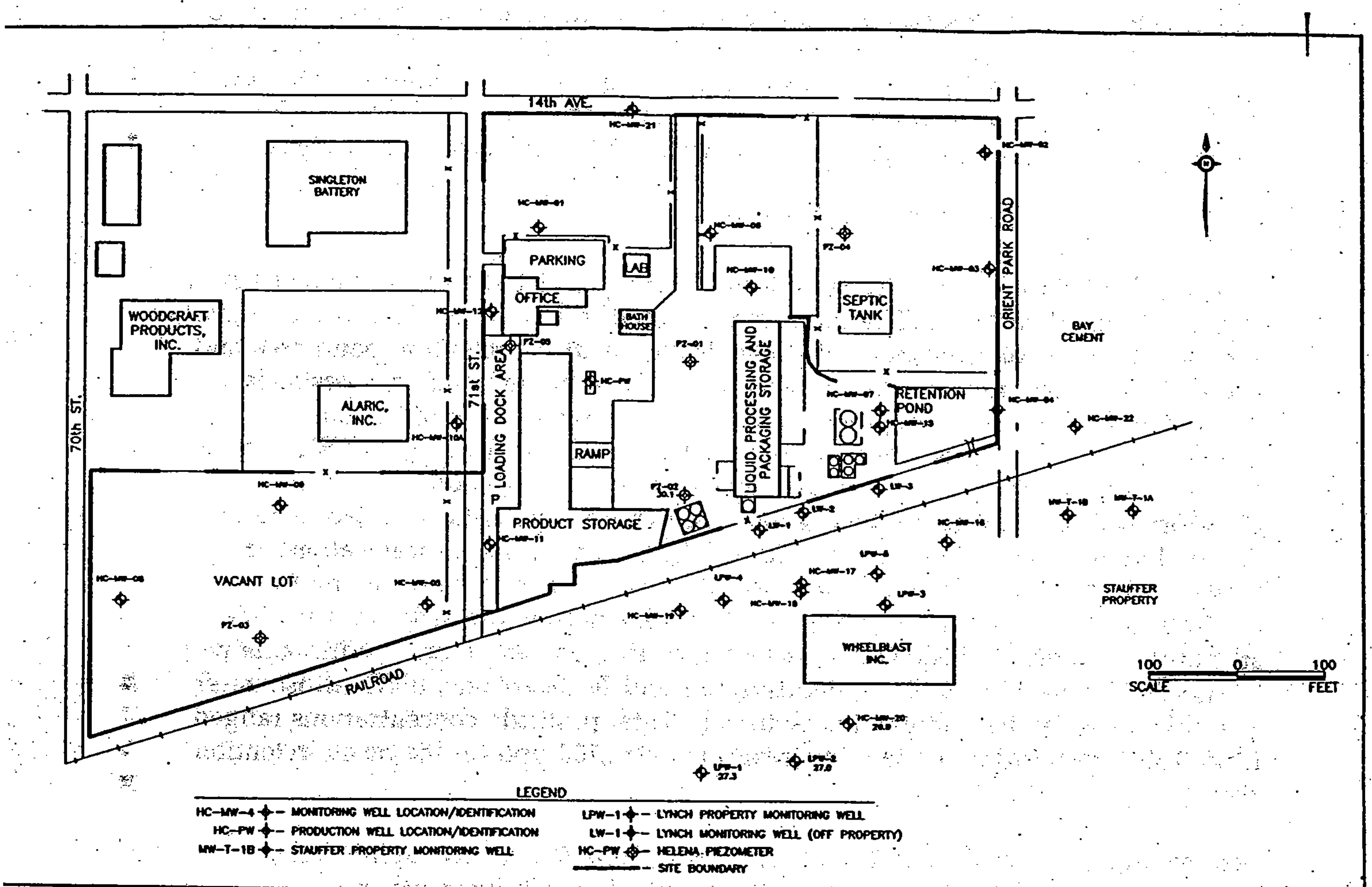
The highest pesticide concentrations in ground water are just south of the facility. Pesticides in the surficial aquifer are primarily BHC (including lindane), DDT and related degradation products, and endosulfans. Those components making up a less significant fraction of the total pesticides in shallow ground water include aldrin, chlordane (both isomers), endrin, endrin ketone, endrin aldehyde, methoxychlor, heptachlor, and heptachlor epoxide. Pesticides in the Floridan Aquifer wells are mainly BHC isomers,, aldrin, and dieldrin with lower concentrations of DDT and related degradation products, endosulfan I, endosulfan II, endosulfan sulfate, chlordane, endrin, endrin ketone, and methoxychlor detected.

Surficial aquifer samples identified a lindane plume in excess of the 0.2 part per billion (ppb) maximum contaminant level (MCL) moving southeast across the HCC site onto adjacent property. Lindane concentrations exceeding MCLs were identified in 12 surficial wells and two surficial piezometers. Floridan Aquifer wells contained a lindane plume moving southeast across the property. Lindane was identified in three Floridan wells with two exceedances of the 0.2 ppb MCL. Isolated exceedances of the MCLs for chlordane, endrin ketone, and heptachlor epoxide also were identified in surficial aquifer ground water samples.

PAHs and phenols are a concern in ground water. The highest concentrations in the surficial aquifer were south and southeast of the former xylene storage tanks along the CSX right-of way and on Wheelblast property adjacent to the site. Detected semi-volatiles in surficial wells included naphthalene, 2-methylnaphthalene, fluorene, and phenols, including methylphenols, chlorophenols, and nitrophenols. Lower concentrations of semi-volatiles in Floridan wells included naphthalene, 2-methylnaphthalene and fluoranthene, and phenols, including chlorophenol and methylphenol.

The highest concentration of VOCs in surficial aquifer ground water were ethylbenzene and xylene, concentrated in the general vicinity of the former xylene and emulsifier storage tanks. Other VOCs in shallow ground water included carbon disulfide, benzene, chlorobenzene, chloroform, 1,2-dichloropropane, PCE, and 2-hexanone. VOCs in the Floridan wells included TCE, PCE, 1,2-dichloroethene (1,2-DCE), ethylbenzene, xylene, trichloroethane, trans-1,3-dichloropropene, and chlorobenzene. Acetone, methylene chloride, and 2-butanone also were detected in samples from both surficial and Floridan wells; however, these are suspected laboratory artifacts. Primary and secondary MCLs for xylene, ethylbenzene, toluene, PCE, and TCE were exceeded in select surficial wells. Primary and secondary MCLs

FIGURE 5-7. MONITORING WELLS AND PIEZOMETRIC LOCATIONS



for PCE, TCE, and benzene also were exceeded in select Floridan wells. PCE and DCE identified in the surficial and Floridan wells appear to be related to the former Alaric property northwest of the Site.

The most commonly detected inorganics in ground water were aluminum, calcium, iron, magnesium, manganese, potassium, and zinc. The highest concentrations were detected along the southern edge and south of the facility, coinciding with the plume of low pH, and in the drum washing area. Infrequently, primary and secondary MCLs were exceeded for antimony, arsenic, beryllium, cadmium, chromium, lead, nickel, and thallium, generally in the area of low pH. The low pH values in ground water are the result of the former sulfur processing facility. Oxidation of sulfur, as the result of contact with water, created low pH conditions. The plume of low pH ground water appears to originate at the former sulfur pit as shown in Figure 6.

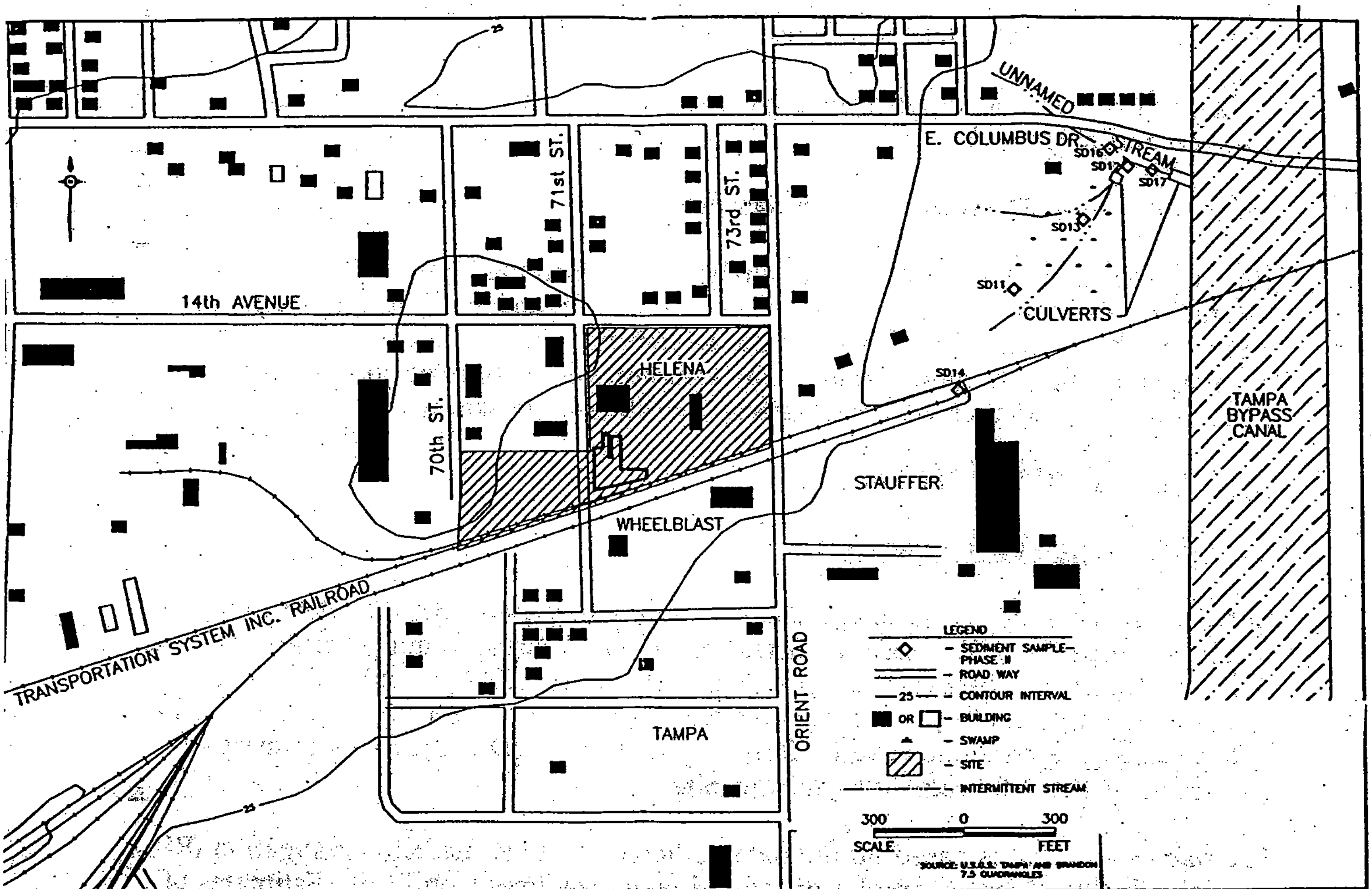
5.5.4 Substances Detected in Sediment

Seventeen sediment samples were collected during the RI at locations shown on Figure 5-5 and Figure 5-8. The samples were analyzed for TCL/TAL compounds. In general, elevated concentrations of pesticides occur in the retention pond area and attenuate from the pond to the spillway area. Outside the pond area pesticide concentrations increase along the surface water pathway south of the Site, culminating in the highest concentrations occurring in the area of the CSX/Orient Road culvert. Contaminant concentrations decrease downgradient from the CSX/Orient Road culvert to the drainage depression and wetland adjacent to the Tampa Bypass Canal. On the west side of the Site, pesticide concentrations are highest directly across from the product storage area, and decrease along the northern drainage path from this area. Pesticides detected in sediments include DDT and associated metabolites, aldrin, dieldrin, endrin, endrin ketone, endrin aldehyde, heptachlor, heptachlor epoxide, endosulfan I and II, toxaphene, BHC (all isomers), and chlordane (alpha and gamma isomers). Total pesticide concentrations ranged from 0.3015 ppb (in the unnamed stream) to 2,912,700 ppb (in the onsite retention pond).

Semi-volatiles detected in sediment samples include PAHs (acenaphthalene, anthracene, benzo(a)anthracene, benzo(b)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, carbazole, chrysene, dibenz(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, naphthalene, phenanthrene, and pyrene). Other semi-volatiles include phenols, bis(2-ethylhexyl)phthalate, dibenzofuran, dichlorobenzidine, diethylphthalate, and di-n-butyl phthalate.

The highest concentrations of VOCs were detected in the retention pond. VOCs detected in sediments include ethylbenzene, total xylenes, toluene, and carbon disulfide.

FIGURE 5-8: PHASE II OFFSITE SEDIMENT SAMPLING LOCATIONS



Inorganics detected in sediments include the aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, potassium, sodium, vanadium, and zinc. The highest concentrations of total metals were detected in the upgradient wetland sample, and the highest concentration of cyanide was detected in the background stream sample.

5.5.5 Substances Detected in Surface Water

Surface water was not sampled during the RI due to lack of rainfall of adequate duration and magnitude.

5.5.6 Substances Detected in Biota Samples

Two biota samples were collected for analyses. The sample locations are shown on Figure 5-8. The samples were composed of benthic organisms including freshwater clams, an aquatic snail, and other benthic organisms. Only a limited amount of material could be collected; therefore, the samples were submitted for pesticides analysis only. Pesticides were not detected in either biota sample.

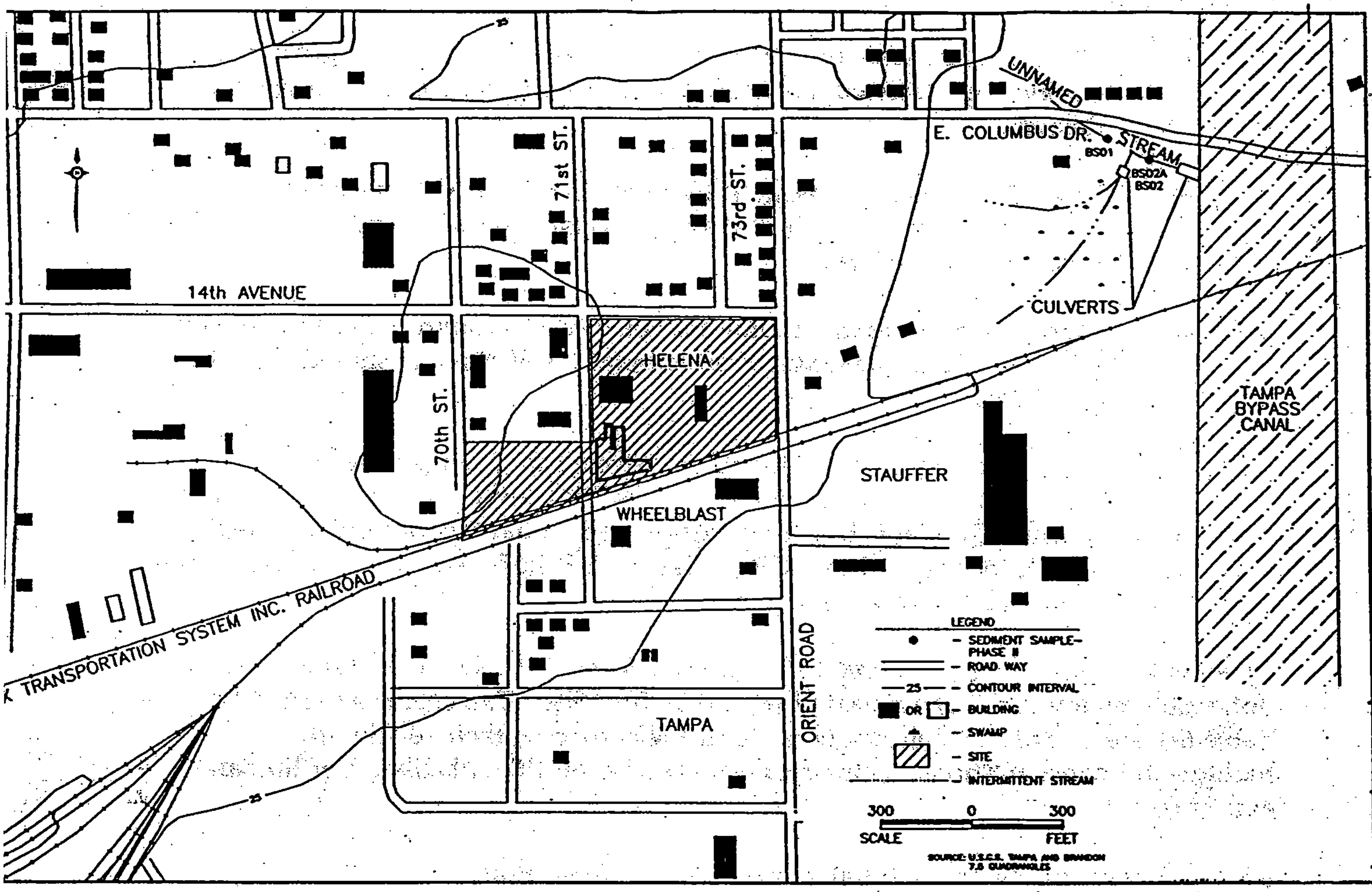
6.0 SUMMARY OF SITE RISKS

6.1 Risk Assessment Overview

CERCLA directs EPA to conduct a Baseline Risk Assessment (BRA) to determine whether a Superfund Site poses a current or potential threat to human health and the environment in the absence of any remedial action. The BRA provides the basis for taking action and indicates contaminants and the exposure pathways that need to be addressed by the remedial action. This section of the ROD contains a summary of the results of the BRA conducted for this Site.

The risk assessment is based on the data gathered in the Remedial Investigation (RI) and includes analyses of samples of ground water, sediment, and soil. Estimates of current risks are based on this investigation and in the absence of any site-specific remediation, future risk estimates are based on the assumption that current soil and ground water chemical concentrations will persist. Sections 6.2 through 6.6 address the risk assessment evaluation for human health due to exposure to surface soil (i.e., 0-2 feet bls), sediment, and ground water. Section 6.7 describes the potential impacts on aquatic and terrestrial life associated with contamination in sediment adjacent to the Helena Site.

FIGURE 5-9. PHASE II BIOTA SAMPLING LOCATIONS



6.2 Contaminants of Potential Concern (COPCs) to Human Health

6.2.1 Screening Criteria

The chemicals measured in the various environmental media during the RI were evaluated for inclusion as chemicals of potential concern in the risk assessment by application of screening criteria. The screening criteria which resulted in elimination and selection of chemicals included the following:

- Inorganic contaminant concentrations less than two times greater than the average detected value of the respective background sample may be deleted.

- Essential nutrients present at low concentrations (i.e., only slightly elevated above naturally occurring levels) and only toxic at very high doses may be deleted.

- Inorganic and organic chemicals detected in ground water that exceed state or federal maximum contaminant levels (MCLs) should be selected as COPC.

- Inorganic and organic chemicals detected in ground water that exceed concentrations that represent a cancer risk level greater than 1×10^{-6} or a Hazard Quotient (HQ) of 0.1 using residential tap water assumptions should be selected as COPC. Region 3 Risk-Based Concentration Tables were used to screen chemicals.

As a result of applying the above listed criteria, Table 6-1 lists the contaminants of potential concern (COPC) associated with the HCC Site. The chemicals listed in Table 6-1 are of greatest concern because of their toxicity, their relation to background concentrations, their prevalence onsite, and the likelihood of human exposure.

6.2.2 Contaminants of Potential Concern in Surficial Soil

Five naturally occurring essential nutrients were eliminated. Twenty-four chemicals were eliminated because they occur at concentrations below the Region 3 Risk-Based screening criteria. Forty-eight chemicals reported in the surface soil onsite meet the COPC criteria (Table 6-1). These were evaluated in the quantitative risk assessment.

While surface soils (0-2 feet bls) are considered a threat to human health due to possible direct exposure, Region 4 does not consider direct exposure to subsurface soils (> 2 feet bls) to be a direct exposure threat. However, removal and treatment of contaminated subsurface soil could minimize the timeframe necessary for ground water restoration and eliminate the need for deed restrictions and five-year reviews.

TABLE 6-1. CONTAMINANTS OF POTENTIAL CONCERN (COPCs)

CHEMICAL	GROUNDWATER FLORIDAN	GROUNDWATER SURFICIAL	SURFACE SOIL	SEDIMENT
1,2-Dichloroethene (total)	X			
1,4-Dichlorobenzene	X			
2,4-Dichlorophenol	X	X		
2,4-Dimethylphenol		X		
2-Butanone		X		
2-Hexanone		X		
2-Methylnaphthalene	X	X	X	X
2-Methylphenol				
4,4'-DDD		X	X	X
4,4'-DDE	X	X	X	X
4,4'-DDT		X	X	X
4-Methyl-2-Pentanone		X		
4-Methylphenol		X		
4-Nirtophenol		X		
Acenaphthylene			X	X
Acetone		X		
Aldrin	X	X	X	X
alpha-BHC	X	X	X	X
alpha-Chlordane		X	X	X
Aluminum	X	X		
Antimony				X
Arsenic	X	X	X	X
Barium		X		
Benzene	X	X		
Benzo(a)anthracene			X	X
Benzo(a)pyrene			X	X
Benzo(b)fluoranthene			X	X
Benzo(g,h,i)perylene			X	X
Benzo(k)fluoranthene			X	X
Beryllium	X	X	X	X
beta-BHC	X	X	X	X
Cadmium	X	X	X	
Carbon Disulfide		X		
Chlorobenzene		X		
Chromium	X	X	X	
Chrysene			X	X
Cobalt	X	X	X	X
Copper	X	X	X	
Cyanide				
delta-BHC	X	X	X	X
Dibenz(a,h)anthracene			X	X
Dibenzofuran			X	X

TABLE 6-1. CONTAMINANTS OF POTENTIAL CONCERN (COPCs) - continued

CHEMICAL	GROUNDWATER FLORIDAN	GROUNDWATER SURFICIAL	SURFACE SOIL	SEDIMENT
Dieldrin	X	X	X	X
Endosulfan I	X	X	X	X
Endosulfan II	X	X	X	X
Endosulfan sulfate	X	X	X	X
Endrin	X	X	X	X
Endrin aldehyde		X	X	X
Endrin ketone	X	X	X	X
Ethylbenzene		X		
gamma-BHC (Lindane)	X	X	X	X
gamma-Chlordane	X	X	X	X
Heptachlor		X	X	X
Heptachlor epoxide		X	X	X
Indeno(1,2,3-cd)pyrene			X	X
Lead	X	X	X	X
Manganese	X	X	X	X
Methoxychlor	X	X	X	X
Naphthalene		X		
Nickel	X			
O,P'DDD			X	
DDE			X	
O,P'DDT			X	
Phenathrene			X	X
Sodium				
Tetrachloroethene	X			
Thallium			X	
Toluene		X		
Toxaphene			X	X
Trans-1,3-Dichloropropene	X			
Trichloroethene	X			
Vanadium	X	X	X	
Xylene (total)	X	X	X	X
Zinc	X	X	X	X

6.2.3 Contaminants of Potential Concern in Surficial Ground Water

Three naturally occurring essential nutrients were eliminated because they are toxic only at very high doses. Fourteen chemicals were eliminated because they were below the Region 3 Risk-Based screening criteria. Forty-eight chemicals reported in the Site-related monitoring wells meet the COPC criteria (Table 6-1). These were evaluated in the quantitative risk assessment.

6.2.4 Contaminants of Potential Concern in the Floridan Aquifer

Two naturally occurring essential nutrients were eliminated because they are toxic only at very high doses. Thirteen chemicals were eliminated because they were below Region 3 Risk-Based screening criteria. Thirty-five chemicals reported in the Site-related monitoring wells meet the COPC criteria (Table 6-1). These were evaluated in the quantitative risk assessment.

6.2.5 Contaminants of Potential Concern in Sediment

Sediments were evaluated using typical human health exposure criteria in the Baseline Risk Assessment. However, because sediments near the site (i.e., sediment located at SD-1, SD-2, SD-3, SD-4, SD-5, SD-6, SD-7, SD-8, SD-9, SD-10, SD-14, and SD-15) are located in ditches that only contain intermittent storm water, EPA and FDEP agree that those sediments should be treated as soil and soil remediation goals should be applied. Therefore, sediment risk and remediation is considered the same as surface soil for the purposes of this ROD. Sediments in the wetland, unnamed tributary, and bypass canal were relatively uncontaminated.

6.3 <u>Exposure Assessment</u>

6.3.1 Introduction

The purpose of the exposure assessment is to estimate the magnitude of potential human exposure to the contaminants of potential concern at the HCC Site. Whether a contaminant is actually a concern to human health and the environment depends upon the likelihood of exposure, i.e. whether the exposure pathway currently is complete or could be complete in the future. A complete exposure pathway (a sequence of events leading to contact with a contaminant) is defined by the following four elements:

- a source and mechanism of release from the source;
- a transport medium (e.g., surface water, air) and mechanisms of migration through the medium;

- the presence or potential presence of a receptor at the exposure point; and

- a route of exposure (ingestion, inhalation, dermal absorption).

If all four elements are present, the pathway is considered complete.

6.3.2 Source, Mechanism of Release, and Transport

The primary release mechanisms are leaks and infiltration from the former pollution control and laboratory waste tanks or drum washing area, and runoff from the retention pond or vacant lot. The secondary source of chemicals is soil. A secondary release mechanism is infiltration into the ground water. Contaminated ground water and soil are believed to be the major sources of potential exposure for human receptors.

6.3.3 Potential Receptors and Routes of Exposure

6.3.3.1 Current/Future Onsite Worker

Onsite workers were assumed to be exposed to Site-related contaminants in soil or air while involved in outdoor activities. The routes of exposure considered for the onsite worker were incidental ingestion and dermal contact with surface soil and inhalation of volatile emissions or fugitive dust. It was assumed that if the Site remains industrial in the future, a future worker would be exposed to Site-related contaminants in a similar manner as the current worker; therefore, the future worker scenario is the same as the current worker scenario.

6.3.3.2 Current/Future Adolescent Trespasser

Nearby residents/trespassers could come into contact with soil. Adolescent trespassers were assumed to be exposed to contaminants in soil through incidental ingestion and dermal contact.

6.3.3.3 Current/Future Adult Trespasser/Vagrant

It is possible that vagrants are gaining access to the site. Vagrants were assumed to be exposed to contaminants in soil via incidental ingestion and dermal contact.

6.3.3.4 Future Resident

Based on surrounding land use, it was assumed that residential development might occur onsite in the future. The routes of exposure considered for the future resident were incidental ingestion and dermal contact with soil. Ground water was evaluated

TABLE 6-2 Exposure Pathways/Routes Helena Chemical Company			
EXPOSURE MEDIA	SCENARIO	RECEPTOR	EXPOSURE PATHWAYS
Ground Water	Future	Onsite Resident (Adult; and Child, 1-6)	1.Ingestion of drinking water 2.Inhalation of VOCs in ground water
Surface Soil	Current/ Future	Worker	1.Incidental Ingestion 2.Dermal Contact
	Current/ Future	Offsite Adolescent (7-16)	1.Incidental Ingestion 2.Dermal Contact
	Current/ Future	Adult Vagrant	1.Incidental Ingestion 2.Dermal Contact
	Future	Onsite Resident (Adult; and Child, 1-6)	1.Incidental Ingestion 2.Dermal Contact

due to the possibility of future contamination of offsite private wells or the installation of a private well onsite. Table 6-2 outlines the potential exposure pathways and routes of exposure for both the current and future scenarios.

6.3.4 Exposure Point Concentrations

The 95 percent upper confidence limit (UCL) on the arithmetic mean was calculated and used as the reasonable maximum exposure (RME) point concentration of contaminants of potential concern in each-media evaluated, unless it exceeded the maximum concentration. Where this occurred, the maximum concentration was used as the RME concentration for that contaminant. Exposures point concentrations are summarized in the Baseline Risk Assessment. The exposure point concentrations for each of the contaminants of potential concern and the exposure assumptions for each pathway were used to estimate the chronic daily intakes for the potentially complete pathways.

6.3.5 Dose Assumptions

The U.S. EPA has developed exposure algorithms for use in calculating chemical intakes through the exposure pathways and routes that are relevant for this Site. Doses are averaged over the number of days of exposure (years of exposure x 365 days/year) to evaluate non-carcinogenic effects, and over a lifetime (70 years x 365 days/year) to evaluate potential carcinogenic health effects. Assumptions used to evaluate each receptor are described below.

- The body weight used for the child (age 1-6) was 15 kg. The body weight used for the adolescent (age 7-16) was 45 kg. The body weight used for the adult was 70 kg.

- Exposure to soil occurs 5 days/week for 50 weeks/year (250 days/year) for the onsite worker, 350 days/year for the onsite resident, and 52 days/year for the current/future trespasser (adult and adolescent).

- Exposure to ground water occurs 350 days/year for the onsite adult and child resident.

- Incidental soil ingestion occurs at a rate of 50 mg/day for the onsite worker, 100 mg/day for the future adult resident, and 200 mg/day for the future child resident.

- Dermal exposure to soil considered an adsorption factor of 1.0 percent for organics and 0.1 percent for inorganics, with an adherence factor of 1.0 mg/cm^2.

- The drinking water ingestion rate was assumed to be 2 L/day for the adult resident and 1 L/day for the child resident or future worker.

6.4 Toxicity Assessment

The purpose of the toxicity assessment is to assign toxicity values (criteria) to each contaminant evaluated in the risk assessment. The toxicity values are used in conjunction with the estimated doses to which a human could be exposed to evaluate the potential human health risk associated with each contaminant. In evaluating potential health risks, both carcinogenic and non-carcinogenic health effects were considered.

Cancer slope factors (CSFs) are developed by EPA under the assumption that the risk of cancer from a given chemical is linearly related to dose. CSFs are developed from laboratory animal studies or human epidemiology studies and classified according to route of administration. The CSF is expressed as $(mg/kg/day)^{-1}$ and when multiplied by the lifetime average daily dose expressed as mg/kg/day will provide an estimate of the probability that the dose will cause cancer during the lifetime of the exposed individual. This increased cancer risk is a probability that is generally expressed in scientific notation (e.g., $1x10^{-6}$ or 1E-6). This is a hypothetical estimate of the upper limit of risk based on very conservative or health protective assumptions and statistical evaluations of data from animal experiments or from epidemiological studies. To state that a chemical exposure causes a $1x10^{-6}$ added upper limit risk of cancer means that if 1,000,000 people are exposed one additional incident of cancer is expected to occur. The calculations and assumptions yield an upper limit estimate which assures that no more than one case is expected and, in fact, there may be no additional cases of cancer. U.S. EPA has established a policy that an upper limit cancer risk falling below or within the range of $1x10^{-6}$ to $1x10^{-4}$ (or 1 in 1,000,000 to 1 in 100,000) is acceptable. It should be noted, however, that the Florida Department of Environmental Protection (FDEP) has established a policy that only risk less than 1×10^{-6} is acceptable.

The toxicity criteria used to evaluate potential non-carcinogenic health effects are reference doses (RfDs). The RfD is expressed as mg/kg/day and represents that dose that has been determined by experimental animal tests or by human observation to not cause adverse health effects, even if the dose is continued for a lifetime. The procedure used to estimate this dose incorporates safety or uncertainty factors that assume it will not over-estimate this safe dose. If the estimated exposure to a chemical expressed as mg/kg/day is less than the RfD, the exposure is not expected to cause any non-carcinogenic effects, even if the exposure is continued for a lifetime. In other words, if the estimated dose divided by the RfD is less than 1.0, there is no concern for adverse non-carcinogenic effects.

6.5 Risk Characterization

6.5.1 Overview

To evaluate the estimated cancer risks, a risk level lower than $1x10^{-6}$ is considered a minimal or de minimis risk. The risk range of $1x10^{-6}$ to $1x10^{-4}$ is an acceptable risk range and would not be expected to require a response action. A risk level greater than $1x10^{-4}$ would be evaluated further and a remedial action to decrease the estimated risk considered. It should be noted, however, that the FDEP has established a policy that only risk less than 1×10^{-6} is acceptable.

A hazard quotient (HQ) of less than unity (1.0) indicates that the exposures are not expected to cause adverse health effects. An HQ greater than one (1.0) requires further evaluation. For example, although the hazard quotients of the contaminants present are added and exceed 1.0, further evaluation may show that their toxicities are not additive because each contaminant affects different target organs. When the total effect is evaluated on an effect and target organ basis the hazard index of the separate chemicals may be at acceptable levels.

Carcinogenic risks and non-carcinogenic hazards were evaluated for potential exposures to contaminants of potential concern in soil, sediment, and ground water. The receptor population was current/future onsite worker, current/future adolescent trespasser, current/future adult trespasser, and future residents. The results are summarized in Table 6-3 and are described below.

TABLE 6-3. SUMMARY OF POTENTIAL CANCER AND NON-CANCER RISKS

Exposure Medium/Pathway	Current/Future Worker		Current/Future Adolescent Trespasser		Current/Future Adult Trespasser /Vagrant		Future Resident		
	Cancer	HQ	Cancer	HQ	Cancer	HQ	Cancer	HQ	
								Adult	Child
Surface Soil									
Incidental Ingest	$2x10^{-3}$	5	$5x10^{-4}$	3	$3x10^{-4}$	2	$2x10^{-2}$	10	100
Dermal Contact	$2x10^{-3}$	5	$6x10^{-4}$	4	$3x10^{-4}$	2	$1x10^{-2}$	7	50
Ground Water									
Ingestion	NE	NE	NE	NE	NE	NE	$2x10^{-2}$	100[a]	200[a]
Inhalation	NE	NE	NE	NE	NE	NE	$8x10^{-7}$	1[a]	3[a]
TOTAL	**$4x10^{-3}$**	**10**	**$1x10^{-3}$**	**7**	**$6x10^{-4}$**	**4**	**$5x10^{-02}$ [b]**	**100[b]**	**400[b]**

NOTES: NE Not Evaluated for this receptor.

-- Carcinogenic toxicity value not applicable.

[a] The hazard index provided is for ingestion of ground water from the surficial aquifer. The hazard indices for ingestion and inhalation of ground water from the Floridan Aquifer for adult and child residents are 20 and 2, and 50 and 5, respectively.

[b] The hazard index provided includes ingestion of ground water from the surficial aquifer only. The total hazard indices including ingestion and inhalation of ground water solely from the Floridan aquifer for adult and child residents are 20 and 50, respectively.

6.5.2 Current/Future Onsite Worker

The total incremental lifetime cancer risks for the current/future onsite worker through exposure to chemicals in soil was $4x10^{-03}$, primarily due to incidental ingestion of and dermal contact with aldrin, toxaphene, and dieldrin in soil. The total hazard index for the current/future worker was 10, primarily due to incidental ingestion of and dermal contact with aldrin, chlordane, toxaphene, and 4,4'-DDT in soil.

6.5.3 Current/Future Adolescent Trespasser

Current/future adolescent trespassers near the Site were assumed to be exposed to chemicals in soil and sediment via incidental ingestion and dermal contact. The total cancer risk for the current/future adolescent trespasser through all pathways was $1x10^{-03}$, primarily due to incidental ingestion of and dermal contact with aldrin, toxaphene, and dieldrin in soils. The total hazard index for the current/future adolescent trespasser was 7, primarily due to incidental ingestion of and dermal contact with aldrin, chlordane, toxaphene, and 4,4'-DDT in soils.

6.5.4 Current/Future Adult Trespasser/Vagrant

Current/future adult trespassers/vagrants near the Site were assumed to be exposed to chemicals in soil via incidental ingestion and dermal contact. The total cancer risk for the current/future adult trespasser through all pathways was $6x10^{-04}$, primarily due to incidental ingestion of and dermal contact with aldrin, toxaphene, and dieldrin in soils. The total hazard index for the current/future adolescent trespasser was 4, primarily due to incidental ingestion of and dermal contact with aldrin, chlordane, and toxaphene in soils.

6.5.5 Future Resident

Potential future residents at the Site were assumed to be exposed to chemicals in onsite soils through incidental ingestion and dermal contact. In addition, the future resident (adult or child) was assumed to be exposed to chemicals in ground water through drinking water ingestion and inhalation. The total cancer risk for the future resident (adult and child) through all pathways was $5x10^{-02}$ when exposed to chemicals in soils and the surficial aquifer, or $3x10^{-02}$ when exposed to chemicals in soils and the Floridan aquifer. Primary contaminants of concern (COCs) in soils are toxaphene, DDD, DDT, chlordane, and dieldrin; while the primary COCs in ground water are alpha-BHC, tetrachloroethane, benzene, arsenic, dieldrin, and aldrin.

The hazard index was calculated for the future adult resident and the future child resident. When exposed to chemicals in soils and surficial aquifer ground water, the hazard indices for the future adult and child residents were 100 and 400, respectively.

When exposed to chemicals in soils and the Floridan aquifer ground water, the hazard indices for the future adult and child residents were 20 and 50, respectively. Primary contaminants of concern (COCs) in soils are toxaphene, DDT, aldrin, chlordane, and dieldrin; while the primary COCs in ground water are gamma-BHC, arsenic, dieldrin, dichlorophenol, ethylbenzene, manganese, and zinc.

6.6 Identification of Uncertainties

Uncertainty is inherent in the risk assessment process. Each of the three components of risk assessment (data evaluation, exposure assumptions, and toxicity criteria) contribute uncertainties. For example, the assumption that ground water concentrations will remain constant over time may overestimate the lifetime exposure. Contaminants are subject to a variety of attenuation processes. In addition, for a risk to exist, both significant exposure to the pollutants of concern and toxicity at these predicted exposure levels must exist. The toxicological uncertainties primarily relate to the methodology by which carcinogenic and non-carcinogenic criteria (i.e., cancer slope factors and reference doses) are developed. In general, the methodology currently used to develop cancer slope factors and reference doses is very conservative, and likely results in an overestimation of human toxicity and resultant risk.

The use of conservative assumptions throughout the risk assessment process are believed to result in an over-estimate of human health risk. Therefore, actual risk may be lower than the estimates presented here but are unlikely to be greater.

6.7 Ecological Evaluation

6.7.1 Overview

The risk to the environment is determined through the assessment of potentially adverse effects to ecosystems and populations resulting from Site-related contamination using qualitative methods. Soils, ground water, and sediments from offsite ditches and the unnamed tributary to the Tampa Bypass Canal were sampled to determine the extent of contamination, as described in Section 5.

6.7.2 Contaminants of Potential Ecological Concern

Contaminants of potential ecological concern (COPECs) were selected by eliminating from the analysis essential nutrients considered toxic only at very high concentrations, pesticides occurring at low frequencies, and by eliminating inorganic analytes whose concentrations were within background concentrations.

6.7.3 Exposure Assessment

Three major habitats (aquatic, wetland, and terrestrial) are represented on or near the Site. The aquatic habitat is represented by the fresh and estuarine deep-water habitat provided by the Tampa Bypass Canal. Wetland habitats east of the HCC Site have been treated collectively as a single habitat. There are two areas (vacant lot and operations area) that may provide habitat for terrestrial species. Areas adjacent to the Site are heavily urbanized, with very little contiguous vegetative cover. Only the aquatic and wetland habitats were evaluated for potential ecological risk due to the HCC Site; the terrestrial habitats were not evaluated because soils will be remediated for protection of human health anyway.

Once the contaminants have reached the habitat, one or more of three possible exposure routes may come into play for a specific receptor. These exposure routes are ingestion, inhalation/respiration, and adsorption (direct contact). The exposure point concentration is the concentration of a contaminant in an environmental media to which a specific receptor is exposed. The maximum concentration detected was used as the exposure point concentration of contaminants of potential concern in each-media evaluated. The exposure point concentrations for each of the contaminants of potential concern and the exposure assumptions for each pathway were used to estimate the chronic daily intakes for the potentially complete pathways.

6.7.4 Toxicity Assessment

6.7.4.1 Exposure to Current Sediments

Sediments were evaluated by comparing maximum sediment concentrations with EPA Region 4 Waste Management Division sediment screening levels. Exceedance of these screening levels might indicate a potential for adverse ecological effects (depending upon factors such as frequency of detection, degree of exceedance, etc.), thus indicating a need for more site-specific ecological investigations, such as toxicity testing. Maximum sediment exposure point concentrations for each contaminant of concern were compared to screening values for a particular contaminant of concern. Surface water was not sampled during the RI, so no current exposure to surface water was evaluated.

6.7.4.2 Exposure to Future Surface Water (Ground Water Surrogate)

Future surface water was evaluated by comparing maximum ground water concentrations with EPA Region 4 Waste Management Division fresh water screening concentrations (chronic). This is due to the potential role of the ground water underlying the site to move contaminants into nearby wetland and deepwater habitats. Exceedance of these screening levels might indicate a potential for adverse ecological effects (depending upon factors such as frequency of detection, degree of exceedance, etc.), thus indicating a need for more site-specific ecological investigations, such as toxicity testing. Maximum ground water exposure point concentrations for each contaminant of concern were compared to screening values for a particular contaminant of concern.

6.7.4.3 Exposure to Future Sediment (Soil Surrogate)

Future sediments were evaluated by comparing maximum soil concentrations with EPA Region 4 Waste Management Division sediment screening levels. This is due to the potential for soils to eventually become sediments within the nearby wetland habitat. Exceedance of these screening levels might indicate a potential for adverse ecological effects (depending upon factors such as frequency of detection, degree of exceedance, etc.), thus indicating a need for more site-specific ecological investigations, such as toxicity testing. Maximum soil exposure point concentrations for each contaminant of concern were compared to screening values for a particular contaminant of concern.

6.7.5 Risk Characterization

6.7.5.1 Exposure to Current Sediments

Comparison of the concentrations of contaminants of concern in sediment with regional screening values was used to assess the likelihood of adverse effects of sediment to wetland and aquatic life. A number of contaminants in sediment exceeded regional screening values. Screening criteria were not available for all detected contaminants; therefore, NOAA ERL values were substituted. Despite the absence of some criteria, the results show that effects already may have occurred to aquatic life inhabiting the wetlands. The site-related chemicals which currently contribute the most to the increased risk in sediments are DDD, DDE, DDT, dieldrin, and chlordane.

6.7.5.2 Exposure to Future Surface Water (Ground Water Surrogate)

Comparison of the concentrations of contaminants of concern in future surface water (ground water surrogate) with regional screening values was used to assess the likelihood of adverse effects of future surface water to wetland and aquatic life. A number of contaminants in future surface water exceeded screening values. Screening levels were not available for all the detected contaminants; therefore, the contribution of all the contaminants of potential concern could not be evaluated. Despite the absence of some criteria, the results show that severe effects may occur if ground water contaminants migrate to surface water at current levels. The site-related chemicals which may contribute the most to the increased risk in surface water are DDD, aluminum, dieldrin, and endrin.

6.7.5.3 Exposure to Future Sediment (Soil Surrogate)

Comparison of the concentrations of contaminants of concern in future sediment (soil surrogate) with regional screening values was used to assess the likelihood of adverse effects of future sediment to wetland and aquatic life. A significant number of contaminants in future sediment exceeded screening values. Screening criteria were not available for all detected contaminants; therefore, NOAA ERL values were substituted. Despite the absence of some criteria, the results show that effects may occur if soil contaminants continue to migrate to sediment at current levels. The site-related chemicals which may contribute the most to the increased risk in sediments are DDD, DDE, DDT, dieldrin, and chlordane. Also, there is an indication of possible adverse biological effects through food chain exposure to contaminants.

6.7.6 Uncertainty Analysis

The main sources of uncertainty associated with this ecological evaluation can be attributed to the items below.

- Information necessary to evaluate the potential effects of aquatic exposures to sediment chemicals is limited.

- The possibility that organisms may be acclimated or adapted to chronic exposure to some chemicals was not considered, and as a result, risks associated with exposure may be overestimated.

- Risk estimates based solely on maximum concentrations in samples collected during one sampling event may overestimate or underestimate the actual population- or community-level effects.

- Sediments constitute complex chemical mixtures and it is possible that antagonistic or synergistic toxicity effects may occur between any of the chemical constituents. These factors were not accounted for.

- Future surface water and sediment concentrations do not account for degradation and attenuation of contaminant concentrations.

7.0 DESCRIPTION OF ALTERNATIVES

7.1 Remedial Action Objectives

Remedial action objectives (RAOs) were developed for the contaminants and media of concern at the Helena Chemical Company Site. RAOs include restoring the Site to beneficial use, reducing risk to human health within EPA's acceptable risk range (i.e., total residual cancer risk between $1x10^{-4}$ to $1x10^{-6}$ and maximum individual contaminant HQ of 1), reducing ecological risk, and protecting ground water from continued degradation by Site contaminants. Remediation goals (RGs) established to satisfy these RAOs are presented in Section 7.1.4 and Table 7-1.

7.1.1 Beneficial Land Use

The Site currently is zoned for industrial use and future land use is expected to remain industrial/commercial. Since zoning is expected to remain industrial/ commercial, remediation goals (Rgs) were developed based on industrial use. The alternatives considered will rely on institutional controls to provide assurance the Site use will remain industrial.

7.1.2 Human Health Risk

If the carcinogenic risk of individual contaminants in soils/sediments are reduced to $1x10^{-5}$, the cumulative residual risk remaining after remediation totals slightly less than $1x10^{-4}$. If the carcinogenic risk of individual contaminants are reduced to $1x10^{-6}$, the cumulative residual risk remaining after remediation totals slightly less than $1x10^{-5}$. EPA's acceptable carcinogenic risk range is between $1x10^{-6}$ and $1x10^{-4}$. FDEP only considers individual contaminant risk less than 1×10^{-6} acceptable. EPA considers it appropriate to reduce individual contaminant concentrations so that each individual contaminant's carcinogenic risk is equal to or less than $1x10^{-6}$ and the cumulative residual risk is equal to or less than $1x10^{-5}$.

For non-carcinogenic risk in soils/sediments, contaminant levels which yield a HQ for an individual contaminant equal to 1 is generally considered acceptable unless there is reason to believe that a large number of contaminants affect the same target organ.

Ground water is required to meet drinking water standards on and offsite and surface water standards prior to entering the Tampa Bypass Canal. For many of the pesticide contaminants in ground water, primary or secondary maximum contaminant levels (MCLs) are not available. For those contaminants, concentrations based on health effects were considered. Bioassay tests may be required during remedial design to determine acceptable surface water standards for many of the contaminants.

7.1.3 Ecological Risk

Plant and animal life will be protected to some extent by remediation of soil and ground water to levels which protect human health. Future sediment and surface water contaminant levels will be lower than current levels and will be more protective.

TABLE 7-1: REMEDIATION GOALS

Chemicals of Concern	Practical Quantitation Levels (1)	Federal or State ARARs or TBCs	Health-Based Remedial Goal Concentrations(2)	Ground Water Protection Remedial Goals	Selected Remediation Goal
SURFACE SOIL/ SEDIMENT	(mg/kg)				
Aldrin	NA	NA	0.18	0.1	0.18
alpha-BHC	NA	NA	0.47	0.004	0.47
DDD	NA	NA	12.6	NR	12.6
DDE	NA	NA	8.9	NR	8.9
DDT	NA	NA	8.9	6	8.9
Chlordane	NA	NA	2.3	NR	2.3
Dieldrin	NA	NA	0.19	0.10	0.19
Heptachlor	NA	NA	0.67	NR	0.67
Heptachlor Epox.	NA	NA	0.34	NR	0.34
Toxaphene	NA	NA	2.76	NR	2.76
GROUND WATER	(ug/L)				
4,4'-DDT	0.1	0.1 4)	0.3	NR	0.3 6)
Aldrin	0.05	0.05 4)	0.006	NR	0.05
alpha-BHC	0.05	0.05 4)	0.02	NR	0.05
beta-BHC	0.1	0.1 4)	0.06	NR	0.1
gamma-BHC	0.05	0.2 3)	10	NR	0.2
Dieldrin	0.1	0.1 4)	0.007	NR	0.1
Endosulfan I	0.05	0.35 4)	2	NR	2
Endosulfan II	0.05	0.35 4)	2	NR	2
Xylene (Total)	4	20 5)	NR	NR	20

NA -- Not Available
NR -- Not Required

NOTES:

1) Practical Quantitation Levels (PQLs) are an estimate of the lowest concentration usually quantifiable by most analytical laboratories. The source of information was the FDEP Groundwater Guidance Concentrations, June 1994.
2) Health based concentrations are based on $1x10^{-6}$ carcinogenic risk or a HQ of 1 for non-carcinogens.
3) Value based on a Federal and State Primary Maximum Contaminant Level (MCL).
4) Value based on Florida Groundwater Guidance Concentrations (To Be Considered (TBCs).
5) Value based on a State Secondary Maximum Contaminant Level (MCL).
6) FDEP's guidance for ground water is more stringent for 4,4-DDT than the site-specific health-based remediation goal selected. Attainment of a more stringent level may be necessary to obtain FDEP's concurrence with deletion of this Site from the National Priorities List in the future.

7.1.4 Remediation Goals

Soil and ground water RGs for protection of human health are presented in Table 7-1. Soil RGs apply to soils and sediments 0 to 2 feet bls and are reflective of concentrations which will leave, in site soils, contamination at the $1x10^{-6}$ individual contaminant carcinogenic risk levels. Remediation goals were not established for metals and volatiles in soils at the site. Soils which contain high levels of metals and volatiles are within the areas where soils are being excavated to remove pesticides; therefore additional goals are not required.

Ground water RGs are reflective of concentrations which will leave, in ground water, contamination at the $1x10^{-6}$ individual contaminant risk levels, individual contaminant HQ of 1, or the instrument quantitation limit. In addition to ground water RGs in Table 7-1, the pH in ground water near the old sulfur pit needs to be increased and stabilized. A pH between 6 and 8.5 is recommended. If high levels of metals remain in ground water after the pH is stabilized, additional RGs for metals may be required.

7.2 Remedial Alternatives

7.2.1 Overview

The FS report included an evaluation of six cleanup methods for contamination in soil, sediment, and ground water. These alternatives represent the range of remedial actions considered appropriate for the Site. As required by CERCLA, a no further action alternative was evaluated to serve as a basis for comparison with the other active cleanup methods. Potential Applicable or Relevant and Appropriate Requirements (ARARs) are summarized in Section 8 for these alternatives. The six alternatives that have been identified for evaluation are listed below:

- Alternative 1: No Action
- Alternative 2: Soil And Shallow Ground Water Containment By Vertical Barriers And A Surface Cap
- Alternative 3: Biologically Treat Soil Onsite; Contain, Extract, Treat and Dispose of Ground Water
- Alternative 4: Biologically treat Soil Onsite; Allow Natural Attenuation of Contamination in Shallow Ground Water
- Alternative 5: Treat Contaminated Soil by Low Temperature Thermal Desorption (LTTD); Contain, Treat and Dispose of Ground Water
- Alternative 6: Treat Contaminated Soil by LTTD; Natural Attenuation of Ground Water

7.2.2 Alternative 1: No Action

CERCLA requires that EPA consider the No Action alternative to serve as a basis against which other alternatives can be compared. Under the no action alternative, the Site would be left as is. Periodic monitoring of Site ground water would be continued for at least 30 years, at a present worth cost of approximately $234,000.

7.2.3 Alternative 2: Contain Contaminated Soil And Ground Water With Vertical Barriers and Surface Cap

Alternative 2 consists of the following remedial actions:

- Implement institutional controls (i.e., fencing and deed restrictions);
- Install a vertical barrier (such as slurry walls, high density polyethylene sheeting, or sheet piling) to reduce horizontal transport of contaminants in ground water from the contaminated soil zone; and
- Install a surface cap consisting of asphalt, concrete, clay, or synthetic material to minimize percolation of precipitation.

This alternative provides an option of containment that reduces short-term risk with moderate to high capital expenditures and low operating and maintenance costs while protecting public health and the environment in the long term. Alternative 2 is expected to require 1 year to reduce soil exposure and over 30 years to monitor ground water. The capital and operation and maintenance (O&M) costs are estimated at $926,000 and $665,000, respectively. The total present worth cost is approximately $ 1.6 million.

7.2.4 Alternative 3: Biologically Treat Soil Onsite; Contain, Extract, Treat and Dispose of Ground Water

Alternative 3 consists of the following remedial actions:

- Implement institutional controls (i.e., fencing and deed restrictions);
- Demolish tank farm pads east of the liquid processing building and dispose of the debris offsite (the tanks may be recycled);
- Excavate material from former sulfur pit and dispose of offsite;
- Neutralize soils in-place if located in areas where sulfur is present but inaccessible;

- Excavate contaminated surface soils and sediments (0-2 feet bls) above soil RGs;

- Biologically treat contaminated surface soils and sediments;

rep. offsite treatment

- Place treated soils back onsite;

- Extract contaminated ground water and treat to meet surface water discharge standards; and

- Discharge treated ground water to the Tampa Bypass Canal under an NPDES permit.

This alternative is based on the growing technical evidence that reductive dechlorination of organic compounds under anaerobic conditions can be used to detoxify a wide range of chlorinated aromatic compounds. The treatment of excavated Site soil would be primarily sequenced anaerobic treatment, especially for soil contaminated with toxaphene and DDT. This treatment would be land-based, with shallow berms and liners to prevent migration and management of water during remediation.

Ground water extraction under this alternative is proposed strictly for purposes of assuring that the bulk of surficial ground water contaminant mass is contained at the source area. Restoration timeframe, although difficult to predict reliably, can be expected to be very long, and may not be significantly accelerated by ground water extraction. The ground water extraction system envisioned includes several individual wells pumped to an on-site treatment unit and discharged to surface water (i.e. Tampa Bypass Canal). This extracted ground water would be treated by any number of physical/chemical means, such as carbon adsorption. A modification to the facilities current National Pollutant Discharge Elimination system (NPDES) permit will be required for surface water discharge. Surface water discharge requirements for the contaminants of concern need to be determined during design.

Pending more complete determination of aquifer characteristics and plume delineation during Remedial Design, extraction wells will be operated to contain the highest concentrations of mobile pesticides, organic solvent and acidity in onsite shallow ground water. Restoration of shallow ground water quality is the goal, but may be inhibited by the low mobility of pesticides. The Floridan Aquifer beneath the site will be monitored as part of this alternative.

The tank farm pads east of the liquid processing and packaging storage building will be demolished, and underlying contaminated soil excavated. Demolition debris will be tested for pesticides, and properly disposed offsite. Tanks that are removed as part of the demolition will be recycled, depending on the condition of the tank and success of decontamination.

Surface soil would be excavated to a depth of 2 feet based on protection of human health. Excavations would be from around formulation and storage buildings, former tank farm areas, and the former sulfur pit area (See Figure 7-1 and 7-2). Material from the former sulfur pit will be disposed offsite, or neutralized to prevent it from further affecting acidity of the ground water and solubilizing metals. Where sulfur is present but inaccessible (for instance, under buildings), in-place neutralization will be employed (e.g., injection of alkaline solutions).

Capital and O&M costs are estimated at $1,100,000 and $1,289,000, respectively. The ground water extraction operation is estimated over a 30 year period. The total estimated present worth cost, with ground water extraction operation for over 30 years, is approximately $ 2.4 million.

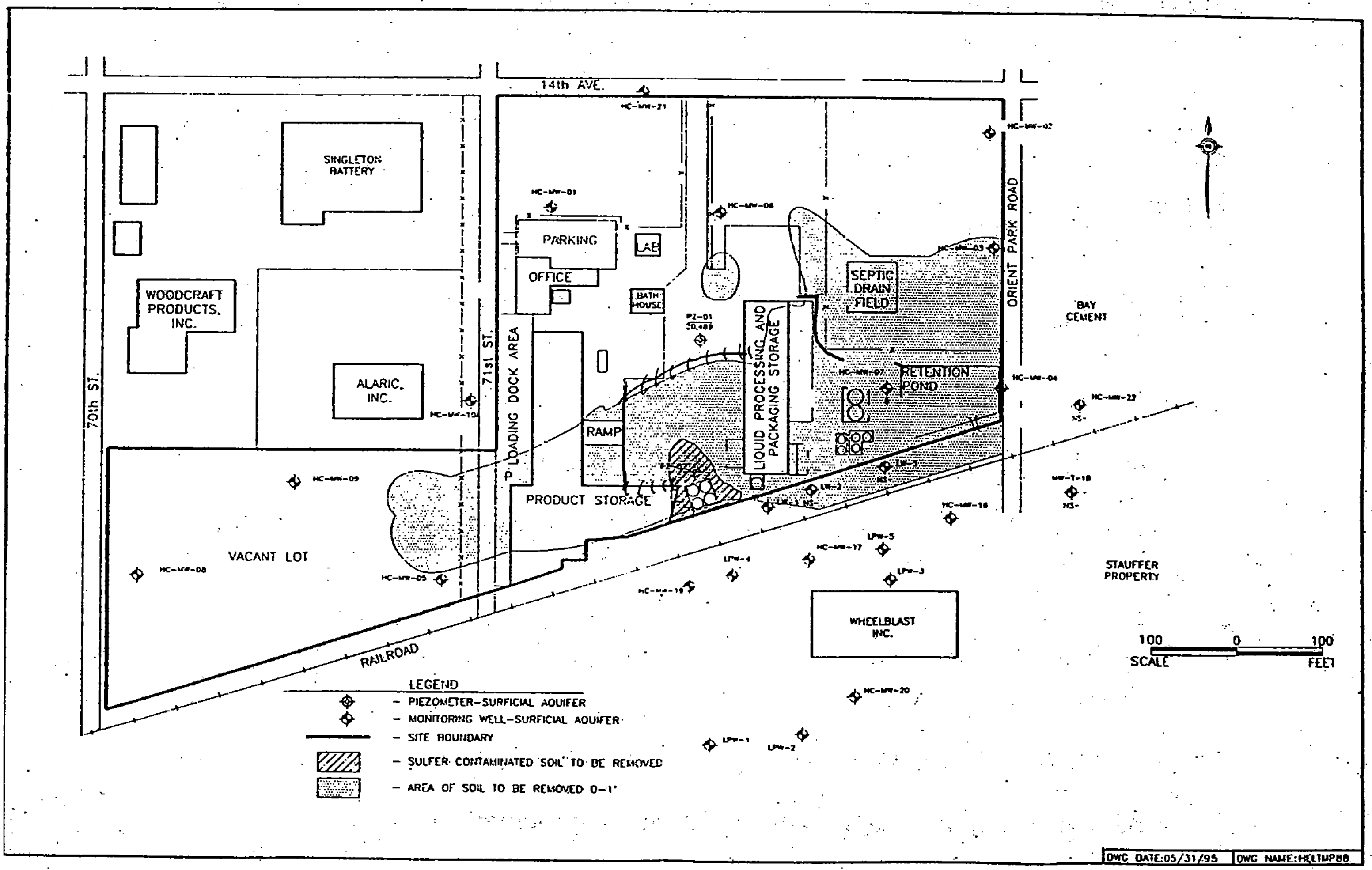
7.2.5 Alternative 4: Biologically Treat Soil Onsite; Allow Natural Attenuation of Contamination in Shallow Ground Water

Alternative 4 consists of the following remedial actions:

- Implement institutional controls (i.e., fencing and deed restrictions);
- Demolish tank farm pads east of the liquid processing building and dispose of the debris offsite (the tanks may be recycled);
- Excavate material from former sulfur pit and dispose of offsite;
- Neutralize soils in-place if located in areas where sulfur is present but inaccessible;
- Excavate contaminated surface soils and sediment (0-2 feet bls) above soil RGs;
- Biologically treat contaminated soils and sediments; and
- Place treated soils back onsite.

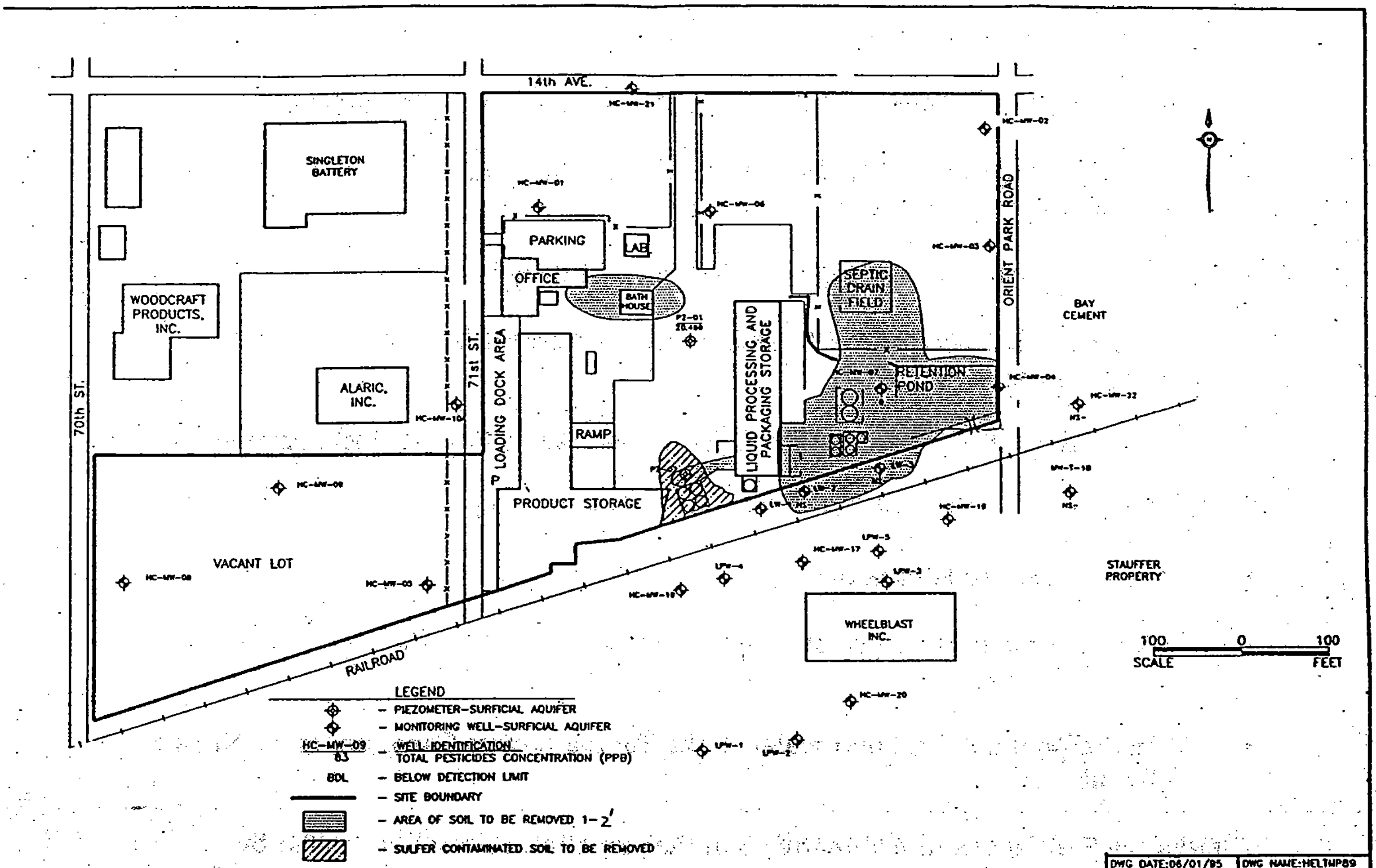
Alternative 4 calls for natural attenuation of contaminant concentrations in ground water. In natural attenuation, subsurface processes are allowed to reduce contaminants through dilution, biodegradation, adsorption, and chemical reactions with subsurface material. Natural attenuation was considered as an alternative to treatment to minimize cost. It requires a comprehensive ground water monitoring program, and the development of a Site-specific fate and transport model, to assure drinking water standards are achieved and the impact to the Floridan aquifer is limited. Modeling performed during the FS, showed natural attenuation would take over 30 years (and up to 100 years) for contamination to reach performance standards by natural attenuation.

FIGURE 7-1. AREA OF SOIL TO BE REMOVED (0-1 feet below land surface)



Note: Area to be excavated is estimated. Offsite excavation may be required to remediate contamination to remediation goals listed in Table 7-1.

FIGURE 7-2. AREA OF SOIL TO BE REMOVED (1-2 feet below land surface)



Capital and O&M costs are estimated at $ 994,000 and $ 847,000. The ground water extraction operation is estimated for over a 30 year period. The total present worth cost is approximately $ 1.8 million.

7.2.6 Alternative 5: Treat Contaminated Soil by Low Temperature Thermal Desorption (LTTD); Contain, Treat and Dispose of Ground Water

Alternative 5 consists of the following remedial actions:

- Implement institutional controls (i.e., fencing and deed restrictions);
- Demolish tank farm pads east of the liquid processing building and dispose of the debris offsite (the tanks may be recycled);
- Excavate material from former sulfur pit and dispose of offsite;
- Neutralize soils in-place if located in areas where sulfur is present but inaccessible;
- Excavate contaminated surface soils and sediments (0-2 feet bls) above RGs;
- Treat contaminated surface soils and sediments using LTTD;
- Place treated soils back onsite;
- Extract contaminated ground water and treat to meet surface water discharge standards; and
- Discharge treated ground water to the Tampa Bypass Canal under an NPDES permit.

Alternative 5 differs from Alternative 3 in that contaminated soil is treated by thermal desorption in a rotary dryer, or by indirect heated vacuum desorber. Thermal desorption is a commercially available and proven technology for decontamination of pesticide-tainted soil and debris. Essentially, the temperature of soil is raised only to the level needed to vaporize organic contaminants from the soil. These vapors then are collected in an off-gas system for destruction or disposal. As long as soil containing heavy concentrations of elemental sulfur is separated or blended, Site conditions pose no complication to the use of the technology. The indirect heated vacuum desorber is a new modification of this proven technology and should be easier to implement due to its mobility and smaller space requirements.

The treatment of ground water will be handled by any number of physical/chemical means, such as carbon adsorption, which has been shown to be effective in the removal of low concentrations of pesticides and organic solvents from ground water. This treatment will assure that the bulk of surficial ground water contaminant mass is contained at the source area.

Capital costs are estimated to range from $ 832,000 to $1,756,000, depending on the type of LTTD selected. O&M costs are estimated to range from $ 2,827,000 to $3,555,000, depending on the type of LTTD selected. Total present worth cost, with ground water extraction over a period of 30 years, is estimated to range from $ 3,659,000 to $ 5,311,000.

7.2.7 Alternative 6: Treat Contaminated Soil by LTTD; Natural Attenuation of Ground Water

Alternative 6 consists of the following remedial actions:

- Implement institutional controls (i.e., fencing and deed restrictions);
- Demolish tank farm pads east of the liquid processing building and dispose of the debris offsite (the tanks may be recycled);
- Excavate material from former sulfur pit and dispose of offsite;
- Neutralize soils in-place if located in areas where sulfur is present but inaccessible;
- Excavate contaminated surface soils (0-2 feet) above RGs;
- Treat contaminated surface soils using LTTD; and
- Place treated soils back onsite.

Alternative 6 combines the soil treatment method of Alternative 5 (LTTD) with using natural attenuation for shallow ground water contamination, as described for Alternative 4. Soil cleanup levels are expected to require less than 1 year to achieve. Ground water cleanup levels are expected to require over 30 years (and up to 100 years) to achieve.

Capital costs are estimated to range from $ 726,000 to $ 1,650,000, depending on the type of LTTD selected. O&M costs are estimated to range from $ 2,385,000 to $ 3,113,000, depending on the type of LTTD selected. Total present worth cost, with natural attenuation over a period of 30 years (and up to 100 years), is estimated to range from $ 3,111,000 to $ 4,763,000.

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

8.1 Statutory Balancing Criteria

This section of the ROD provides the basis for determining which alternative provides the best balance with respect to the statutory balancing criteria in Section 121 of CERCLA, 42 U.S.C. § 9621, and in the NCP, 40 CFR § 300.430. The major objective of the Feasibility Study (FS) was to develop, screen, and evaluate alternatives for the remediation of the HCC Site. A wide variety of alternatives and technologies were identified as candidates to remediate the contamination at the HCC Site. These were screened based on their feasibility with respect to the contaminants present and the Site characteristics. After the initial screening, the remaining alternatives/technologies were combined into potential remedial alternatives and evaluated in detail. One remedial alternative was selected from the screening process using the following nine evaluation criteria:

- overall protection of human health and the environment;
- compliance with applicable or relevant and appropriate requirements (ARARS);
- long-term effectiveness and permanence;
- reduction of toxicity, mobility, or volume of hazardous substances or contaminants;
- short-term effectiveness or the impacts a remedy might have on the community, workers, or the environment during the course of implementation;
- implementability, that is, the administrative or technical capacity to carry out the alternative;
- cost-effectiveness considering costs for construction, operation, and maintenance of the alternative over the life of the project;
- acceptance by the State, and
- acceptance by the Community.

The NCP categorizes the nine criteria into three groups:

(1) Threshold Criteria - overall protection of human health and the environment and compliance with ARARs (or invoking a waiver) are threshold criteria that must be satisfied in order for an alternative to be eligible for selection;

(2) Primary Balancing Criteria - long-term effectiveness and permanence; reduction of toxicity, mobility or volume; short-term effectiveness; implementability and cost are primary balancing factors used to weigh major trade-offs among alternative hazardous waste management strategies; and

(3) Modifying Criteria - state and community acceptance are modifying criteria that are formally taken into account after public comments are received on the proposed plan and incorporated into the ROD.

The following analysis is a summary of the evaluation of alternatives for remediating the HCC Site under each of the criteria. A comparison is made between each of the alternatives for achievement of a specific criterion.

8.2 Threshold Criteria

8.2.1 Overall Protection of Human Health and the Environment

With the exception of the No Action alternative (Alternative 1), all of the alternatives would provide protection for human health and the environment to some degree. The remaining alternatives achieve protectiveness through the application of engineering controls, or a combination of controls and treatment. Since Alternative 1 did not pass this threshold criteria for providing protection of human health and the environment, it was eliminated from further consideration.

8.2.2 Compliance With ARARs

The remedial action for the HCC Site, under Section 121(d) of CERCLA, must comply with federal and state environmental laws that either are applicable or relevant and appropriate (ARARs). Applicable requirements are those standards, criteria or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements are those that, while not applicable, still address problems or situations sufficiently similar to those encountered at the Site and that their use is well suited to the particular site. To-Be-Considered Criteria (TBCs) are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary level of cleanup for protection of human health or the environment. While TBCs do not have the status of ARARS, EPA's approach to determining if a remedial action is protective of human health and the environment involves consideration of TBCs along with ARARs.

Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely on the basis of location. Examples of location-specific ARARs include state and federal requirements to protect floodplains, critical habitats, and wetlands, and solid and hazardous waste facility siting criteria. Table 8-1 summarizes the potential location-specific ARARs and TBCs for the HCC Site.

Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. Since there are usually several alternative actions for any remedial site, various requirements can be ARARs. Table 8-2 lists potential action-specific ARARs and TBCs for the HCC Site.

Chemical-specific ARARs are specific numerical quantity restrictions on individually-listed contaminants in specific media. Examples of chemical-specific ARARs include the MCLs specified under the Safe Drinking Water Act as well as the ambient water quality criteria that are enumerated under the Clean Water Act. Because there are usually numerous contaminants of potential concern for any remedial site, various numerical quantity requirements can be ARARs. Table 8-3 lists potential chemical-specific ARARs and TBCs for the HCC Site.

Alternatives 2 through 6 would meet or exceed all chemical-specific ARARs and would be designed to meet location- and action-specific ARARs. Restoration of the surficial aquifer is expected to be achieved eventually through natural attenuation of pesticide constituents, whether or not ground water from the surficial aquifer is extracted. For alternatives where excavation and offsite disposal of sulfur-containing soil is envisioned, transportation and disposal will comply with RCRA.

8.3 <u>Primary Balancing Criteria</u>

8.3.1 Long-Term Effectiveness and Permanence

Alternative 2 relies strictly on engineered containment of contaminated soils and ground water. Alternative 2 would be effective and protective as long as the integrity of the cap and slurry wall were maintained. Alternatives 3 through 6 include excavation and irreversible treatment of pesticide-contaminated soil, which is the primary source of risk by direct exposure or migration to ground water. Alternatives 3 and 5 actively address ground water contamination (i.e., through pumping and treating ground water), where as, Alternatives 4 and 6 passively address ground water contamination (i.e., through natural attenuation). Ground water remediation, whether active or passive, will be effective and permanent.

8.3.2 Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative 2 does not call for treatment. Alternatives 3 through 6 rely on treatment of pesticide and sulfur-containing soils. Alternatives 3 and 5 rely on treatment of

Table 8-1: Potential Location Specific ARARs and TBCs			
Requirements	Status	Requirement Synopsis	Application to the RI/FS
Federal and State Requirements			
RCRA Location Requirements 40 CFR 264.18(c)	Relevant and Appropriate	Establish minimum requirements for design, construction, and operation of a facility where treatment, storage, or disposal of hazardous waste will be located.	Treatment, disposal, and storage of hazardous materials may take place during remediation of the site.
National Historic Preservation Act of 1966 16 U.S.C. 470 et seq. 36 CFR Part 800	Not Applicable	Requires that the action not affect or harm registered historic places or historic landmarks.	No registered historic places or historic landmarks are onsite or nearby.
Endangered Species Act 16 U.S.C. 1531 et seq. 50 CFR Part 402	Applicable	Action must avoid jeopardizing the continued existence of listed endangered or threatened species or modification of their habitat.	Endangered species may be present in the vicinity of the HCC Tampa site.
Executive Order 11990 Wetlands Protection Policy	Relevant and Appropriate	Sets forth policy for the protection of wetlands.	There is a wetland east-northeast of the HCC site.
Clean Air Act National Ambient Air Quality Standards 40 CFR Part 50	Applicable	Establish emissions standards to protect public health and public welfare. These standards are national limitations on ambient air intended to protect health and welfare.	Hillsborough County is a non-attainment area for ozone and total suspended particulates.
Florida Rules on Permits Title 62 Chapter 62-4	Relevant and Appropriate	Establish requirements and procedures for all permitting required by the FDEP, and define anti-degradation requirements.	Requirements may apply to site depending upon remedial actions and discharge options selected. Permits are not required for onsite actions.
Florida Ambient Air Quality Standards Title 62 Chapter 62-2	Applicable	Establish ambient air quality standards and ambient test methods.	Remedial actions may include technologies which have air emissions.
Florida Water Quality Standards Title 62 Chapters 62-3	Applicable	Establish minimum water quality criteria for ground water.	Remedial objectives require remediation of the surficial and Floridan aquifers.
Florida Ground water Classes, Standards, and Exemptions Titles 62 Chapter 62-520	Applicable	Establish water classes, standards and exemptions for ground water.	Remedial actions may include classing ground water.
Florida Surface Water Standards Title 62 Chapters 62-301 and 62-302	Applicable	Establish water quality standards for all waters of the state.	Remedial objectives require protection of surficial water. Remedial actions may impact surficial water bodies.
Florida Industrial Wastewater Facilities Regulations Title 62 Chapter 62-660	Applicable	Establish effluent limitations and minimum treatment requirements for industrial facilities; establishes water quality criteria.	Remedial actions may require treated effluent to be discharged as per state and federal regulations.
Florida Underground Injection Control Regulations	Applicable	Establish construction standards, permitting procedures, and operating requirements for underground injection wells.	Remedial actions may include underground injection as a disposal option for treated effluent.

Table 8-2: Potential Action Specific ARARs and TBCs			
Requirements	**Status**	**Requirement Synopsis**	**Application to the RI/FS**
Federal and State Requirements			
RCRA Identification of Hazardous Waste 40 CFR 261	Applicable	Criteria for identifying those solid wastes subject to regulation as hazardous waste under RCRA	Suspected hazardous wastes at HCC should be identified as RCRA hazardous waste for offsite disposal or treatment.
RCRA Identification Hazardous Waste 40 CFR 261.33 (d)	Applicable	Defines a material as hazardous waste if it is a residue or contaminated soil, water or other debris resulting from the cleanup of a spill into or on nay land or water of any commercial chemical product or manufacturing chemical intermediate having the generic name listed in the section.	Soil and ground water contamination at HCC may be identified as hazardous waste for offsite disposal or treatment.
RCRA Facility Standards	Relevant and Appropriate	Establish minimum standards for the acceptable management of RCRA hazardous wastes. Include preparedness and prevention measure, general facility standards, and contingency and emergency procedures.	These standards may be relevant and appropriate to HCC if treatment, storage, and/or disposal of RCRA hazardous wastes occurs onsite during remediation.
RCRA Manifest System, Recordkeeping, and Reporting 40 CFR 264 Subpart E	Relevant and Appropriate	Establish the rules and recordkeeping requirements for offsite transportation of RCRA hazardous materials for treatment and/or disposal.	These procedures may be relevant and appropriate to HCC if offsite transportation of RCRA hazardous for treatment and/or disposal is necessary during site remediation.
RCRA Ground Water Monitoring Requirements 40 CFR 264 Subpart F	No Applicable	Establish minimum requirements for ground water monitoring and protection standards for RCRA facilities.	All onsite remedial actions are governed by CERCLA.
RCRA Closure and Post-closure Requirements 40 CFR 264 Subpart G	Not Applicable	Establish minimum requirements for closure and post-closure care of a RCRA facility engaging in treatment, storage, and/or disposal of hazardous wastes. Closure requirements include in-place wastes and remediated areas.	All onsite remedial actions are governed by CERCLA.
RCRA Storage Requirements 40 CFR 264 Subparts I, J, and L	Relevant and Appropriate	Establish minimum requirements for the storage of hazardous wastes.	These requirements may be relevant and appropriate because RCRA hazardous waste may be stored onsite prior to offsite disposal or onsite treatment.
RCRA Landfill Requirements 40 CFR 264 Subpart M	Relevant and Appropriate	Establish minimum requirements for the design and construction, operation and maintenance, monitoring and inspection, closure and post closure care for a hazardous waste landfill.	These requirements may be relevant and appropriate if remedial actions include RCRA hazardous waste to be landfill onsite.
RCRA Treatment Requirements 40 CFR 264 Subparts O and X	Relevant and Appropriate	Establish minimum requirements for the permit approval, operation, and standards for incineration and other treatment for hazardous wastes.	Treatment standards may be relevant and appropriate to onsite remediation including incineration and/or treatment of hazardous wastes.

Table 8-2: Potential Action Specific ARARs and TBCs			
Requirements	Status	Requirement Synopsis	Application to the RI/FS
Federal and State Requirements			
RCRA Land Disposal Restrictions 40 CFR 268	Applicable	Certain classes of waste are restricted from land disposal without acceptable treatment.	Removal of soil from HCC for land disposal may trigger the regulation after its effective date for CERCLA wastes on 5/8/93.
Clean Air Act National Ambient Air Quality Standards 40 CFR Part 50	Applicable	Establish standards for emissions to protect public health and public welfare. These standards are national limitations on ambient air intended to protect health and welfare.	Hillsborough County is a non-attainment area for ozone and total suspended particulates.
Clean Water Act Discharge Limitations NPDES Permit 40 CFR 122,125,129,136 Pretreatment Standards 40 CFR 403.5, 40 CFR 455.20	Applicable	Prohibit unpermitted discharge of any pollutant or combination of pollutants to waters of the U.S. from any point source. Standards and limitations are established for these discharges and discharges to Publicly Owned Treatment Works (POTWs).	Remedial actions may include the discharge of treated ground water, runoff, or other flows to surface water or publicly owned treatment facility.
Safe Drinking Water Act Underground Injection control Program 40 CFR 144	Applicable	Regulate the use of five classes of underground injection wells for disposal of hazardous substances.	Would be relevant and appropriate if injection well technology is used as apart of site remediation.
Department of Transportation Rules for the Transport of Hazardous Substances 49 CFR Parts 107 and 171-179	Applicable	Regulate the labeling, packaging, placarding, and transportation of solid and hazardous wastes offsite.	Remedial actions may include the offsite transport and disposal of solid and hazardous wastes.
Florida Air Pollution Rules Title 62 Chapter 62-2	Applicable	Establish emission standards, emission rates, baseline areas, and source classifications for protection of health and welfare. Identifies new source requirement, test and analysis methods.	Remedial actions may include technologies that have air emissions.
Florida Rules on Permits Title 62 Chapter 62-4	Relevant and Appropriate	Establish requirements and procedures for all permitting required by the FDEP and define anti-degradation requirements.	Requirements may apply to site depending upon remedial actions and discharge options selected. Permits are not required for onsite actions.
Florida Ambient Air Quality Standards Title 62 Chapter 62-2	Applicable	Establish ambient air quality standards and ambient test methods.	Remedial actions may include technologies which have air emissions.
Florida Water Quality Standards Title 62 Chapter 62-2	Applicable	Establish minimum water quality criteria for ground water.	Remedial objectives require remediation of the surficial and Floridan aquifers.
Florida Ground Water Classes, Standards, and Exemptions Title 62 Chapter 62-520	Applicable	Establish water classes, standards, and exemptions for ground water.	Remedial actions may include classing ground water.
Florida Surface Water Standards Title 62 Chapters 62-301 and 62-302	Applicable	Establish water quality standards for all waters of the state.	Remedial objectives require protection of surficial water. Remedial actions may impact surficial water bodies.
Florida Stormwater Discharge Regulations Title 62 Chapter 62-25	Applicable	Establish design and performance standards and permit requirements for stormwater discharge facilities.	Remedial actions may impact stormwater discharge patterns at HCC.

Table 8-2: Potential Action Specific ARARs and TBCs			
Requirements	Status	Requirement Synopsis	Application to the RI/FS
Federal and State Requirements			
Florida Drinking Water Standards Title 62 Chapter 62-550	Applicable	Establish MCLs for drinking water. Establishes secondary requirements.	Remedial objectives require restoration of the surficial and Floridan aquifers to drinking water status.
Florida Resource and Recovery and Management Regulations Title 62 Chapter 62-7	Applicable	Establish guidelines for resource recovery programs as well as hazardous waste site disposal and monitoring criteria.	If hazardous wastes or other wastes are disposed of onsite, these regulations would become applicable.
Florida Hazardous Waste Rules Title 62 Chapter 62-730	Applicable	Establish standards for generators and transporters of hazardous wastes, and owners and operators of hazardous waste facilities. Outlines permitting requirements.	Applicable if remedial actions generate and/or transport hazardous wastes.
Florida Hazardous Substances Release Notifications Rules Title 62 Chapter 62-150	Applicable	Establish notification requirements in the event of a hazardous substance release.	May apply in the event of a hazardous substance release in conjunction with remedial activities.
Florida Underground Injection Control Regulations Title 62 Chapter 62-28	Relevant and Appropriate	Establish construction standards, permitting procedures, and operating requirements for underground injection wells.	Remediation may include underground injection as a disposal option for treated effluent.
Florida Rules on Hazardous Waste Warning Signs	Applicable	Establish standard warning messages and specifications for signs used at hazardous waste sites.	Remediation systems may require signs for public notification. Appropriate signs are located on the site.

Table 8-3: Potential Chemical-Specific ARARs and TBCs			
Requirements	**Status**	**Requirement Synopsis**	**Application to the RI/FS**
Federal and State Requirements			
RCRA Maximum Concentration Limits 40 CFR 264 Subpart F	Not Applicable	Maximum Concentration Limits have been established for 14 toxic compounds under RCRA ground water protection standards. A compliance monitoring program is included for RCRA facilities.	HCC Tampa site is not a RCRA site.
Safe Drinking Water Act MCLs 40 CFR 141.11-141.16	Relevant and Appropriate	MCLs have been set for toxic compounds as enforceable standards for public drinking water systems. SMCLs are unenforceable goals regulating the aesthetic quality of drinking water.	The surficial and Floridan Aquifer are actual and potential sources of drinking water.
Clean Water Act Federal Water Quality Criteria 51 Federal Register 43665	Relevant and Appropriate	Effluent limitations must meet Best Achievable Technology (BAT) goals. Water Quality Criteria for ambient water quality are provided for toxic chemicals.	Any remedial actions requiring discharges to surface water bodies will have Ambient Water Quality Criteria (AWQCs) as a potential goal.
Clean Air Act National Emission Standards for Hazardous Air Pollutants (HAPs) 40 CFR 61	Relevant and Appropriate	Establish emissions standards, monitoring and testing requirements, and reporting requirements for eight pollutants in air emissions.	No HAPs have been identified for HCC Tampa site.
Clean Air Act National Ambient Air Quality Standards 40 CFR Part 50	Applicable	Establish emissions standards to protect public health and public welfare. These standards are national limitations on ambient air intended to protect health and welfare.	Hillsborough County is non-attainment area for ozone and total suspended particulate; thus, constraints on VOC emission will apply.
Clean Air Act New Source Performance Standards 40 CFR Part 60	Relevant and Appropriate	Establish new source performance standards to ensure that new stationary sources reduce emissions to a minimum. These standards are for sources that cause or contribute to air pollution that may endanger public health or welfare.	Remedial actions may include technologies which have air emissions.
Florida Air Pollution Rules Title 62 Chapter 62-2	Applicable	Establish emission standards, emission rates, baseline areas, and source classifications for protection of health and welfare.	Remedial actions may include technologies that have air emissions.
Florida Rules on Permits Title 62 Chapter 62-4	Relevant and Appropriate	Establish requirements and procedures for all permitting required by FDEP and identify anti-degradation requirements.	Requirements may apply to site depending upon remedial action and discharge options selected. Permits are not required for onsite response actions.
Florida Ambient Air Quality Standards Title 62 Chapter 62-2	Applicable	Establish ambient air quality standards and ambient test methods.	Remedial actions may include technologies which have air emissions.
Florida Water Quality Standards Title 62 Chapters 62-3	Applicable	Establish minimum water quality criteria for ground water.	Remedial objectives require remediation of the surficial aquifer.

Table 8-3: Potential Chemical-Specific ARARs and TBCs			
Requirements	**Status**	**Requirement Synopsis**	**Application to the RI/FS**
Florida Ground water Classes, Standards, and Exemptions Title 62 Chapter 62-520	Applicable	Establish water classes, standards and exemptions for ground water.	Actions may include classing ground water and establishing standards.
Florida Surface Water Standards Title 62 Chapters 62-301 and 62-302	Applicable	Establish water quality standards for all waters of the state.	Remedial objectives require protection of surface water. Remedial actions may impact surface water bodies.
Florida Drinking Water Standards Title 62 Chapter 62-550	Applicable	Establish MCLs for drinking water. Establish secondary requirements for drinking water.	Remedial objectives require restoration of surficial aquifer to drinking water standards.

contaminated ground water to prevent offsite migration and further degradation of the Floridan aquifer. Alternatives 4 and 6 rely on natural attenuation rather than treatment to restore ground water.

8.3.3 Short-Term Effectiveness

Risks to the community and Site workers posed by the implementation of all alternatives are minimal. Engineering controls can be expected to control emissions to air and surface water. The discharge of contaminated shallow ground water to the Tampa Bypass Canal is projected not to cause exceedances of Ambient Water Quality Criteria. Time for restoration of the surficial ground water quality to MCLs is very long because of the nature of the constituents and their release to ground water. Alternatives 3 and 5 provide more control over contaminated ground water than Alternatives 4 and 6 by keeping contaminated ground water from migrating offsite or to the Floridan aquifer.

During the implementation of all the alternatives, both onsite workers and people surrounding the site will be protected from possible impacts caused by construction or O&M activities.

8.3.4 Implementability

Beyond the technical and scheduling difficulties associated with non-intrusive remedy construction at a facility with ongoing operations, all active alternatives are easily undertaken. Pilot-scale treatability testing will be required for biological treatment to assure the same level of reliability in achieving soil treatment goals that LTTD provides.

8.3.5 Cost

The biological alternatives represent the least costly treatment approach, not significantly more costly than the containment measures of Alternative 2. The operation and maintenance cost of ground water extraction, treatment, and disposal under Alternatives 3 and 5, is partially offset by the increased monitoring cost to document natural attenuation of Site constituents in surficial ground water (Alternatives 4 and 6).

A summary of the present worth costs which includes the capital as well as the operation and maintenance cost for each of the alternatives is presented in Table 8-4. These costs were presented in the FS and are based on less stringent Remedial Action Performance Standards than presented in Section 7-1. However, the present worth cleanup costs to meet performance standards are within the range of the FS cost estimate (+50% to -30% accuracy). Therefore, the cost of each alternative should be similar to the cost estimates presented in the FS.

8.4 Modifying Criteria

8.4.1 State Acceptance

The State of Florida, as represented by the Florida Department of Environmental Protection (FDEP), has been the support agency during the Remedial Investigation and Feasibility Study (RI/FS) process for the HCC Site. In accordance with 40 C.F.R. § 300.430, FDEP as the support agency, has provided input during this process by reviewing and providing comments to EPA on all major documents in the Administrative Record. Although FDEP has not indicated an objection to the overall approach of the selected remedy, FDEP is unwilling to concur with this ROD because FDEP disputes the remediation goal selected for 4,4-DDT in ground water.

8.4.2 Community Acceptance

Based on comments expressed at the July 27, 1995, public meeting and receipt of 6 written comments during the comment period, it appears that the community does not disagree with the selected remedy. Specific responses to issues raised by the community can be found in Appendix A, The Responsiveness Summary.

TABLE 8-4: COMPARISON OF COSTS

Alternative	Present-worth Cost	Capital Cost	Operation and Maintenance Cost
1. No-Action	$ 234,000	$ 20,000	$ 214,000
2. Soil and Shallow Ground Water Containment	$ 1,591,000	$ 926,000	$ 665,000
3. Biologically Treat Onsite Soil; Contain, Extract, Treat, & Dispose of Ground Water	$ 2,389,000	$ 1,100,000	$ 1,289,000
4. Biologically Treat Onsite Soil; Natural Attenuation of Ground Water	$ 1,841,000	$ 994,000	$ 847,000
5. Treat Onsite Soil with LTTD; Contain, Extract, Treat, & Dispose of Ground Water	$ 3,659,000 to $5,311,000	$ 832,000 to $ 1,756,000	$2,827,000 to $ 3,555,000
6. Treat Onsite Soil with LTTD; Natural Attenuation of Ground Water	$ 3,111,000 to $4,763,000	$ 726,000 to $1,650,000	$ 2,385,000 to $ 3,113,000

8.5 Comparison of Alternatives

All alternatives, except Alternative 1, provide protection of human health and the environment and achieve all identified ARARs. With respect to short-term effectiveness and implementability, Alternatives 2, 3 and 5 are comparable, because they address exposure to soil and ground water. Alternatives 4 and 6 are equally effective and implementable as Alternatives 3 and 5 for soil , but less effective at addressing short-term exposure to ground water.

The soil treatment components of Alternatives 3 through 6 achieve overall protectiveness and risk reduction by permanently treating the waste and using the treated materials to prevent contact with less affected soils beneath the treatment areas. Alternative 2 achieves similar risk reductions, but does not satisfy the statutory preference for reducing the toxicity and volume of the waste, although the mobility of Site contaminants would be greatly reduced. Therefore, Alternatives 3-6 are preferable to Alternative 2 for soil remediation.

Alternatives 3 and 4 (biological treatment) are designed to provide an innovative, cost-effective and timely remediation tool that will naturally and permanently detoxify contaminated soil or sediment without adversely influencing its physical character. Alternatives 5 and 6, treatment of soils by LTTD, would make use of a proven treatment technology that could be expected to achieve the remedial goals specified in this ROD.

Alternatives 3 and 5 actively remediate ground water using a pump and treat system. Alternatives 4 and 6 passively remediate ground water using natural attenuation. To some extent, the ground water restoration rate is controlled by natural attenuation processes, whether or not ground water extraction is undertaken. Alternatives 3 and 5 provide more protection and control over contaminated ground water by keeping it from migrating offsite and into the Floridan Aquifer.

Alternatives 3 and 5, therefore, are those that best meet the statutory preference for permanent solutions that reduce the toxicity, mobility and volume of waste materials while using technologies that can reasonably be expected to achieve the remedial goals determined to be protective of human health and the environment, and to achieve ARARs. They also fulfill the other criteria regarding long- and short-term effectiveness and implementability. The projected cost for Alternative 3 is significantly less than that for Alternative 5. Given that Alternative 3 can be implemented at significantly less cost than could Alternative 5, Alternative 3 is the preferred alternative.

EPA recognizes, however, that the preferred remedy includes a soil treatment technology (biological treatment) that is an innovative technology that has not been demonstrated capable of achieving performance standards specified in Section 9, below. EPA, therefore, will retain Alternative 5 as a contingency remedy to be implemented should treatability studies of biological treatment prove that this technology is incapable of achieving the performance standards for this Site. The only difference between Alternative 3 and Alternative 5 is the soil treatment technology to be employed. Alternative 5 contains low temperature thermal desorption (LTTD) as the soil treatment technology.

9.0 SUMMARY OF SELECTED REMEDY

Based upon the comparison of alternatives in the Feasibility Study (FS) and upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives and public and state comments, EPA has selected Alternative 3 (i.e., bioremediation of contaminated soils and pump and treat of contaminated ground water) for this Site. The selected alternatives for the Helena Chemical Company Site are consistent with the requirements of Section 121 of CERCLA and the NCP. Based on the information available at this time, the selected alternative represents the best balance among the criteria used to evaluate remedies. The selected alternative will reduce the mobility, toxicity, and volume of contaminated soil and ground water at the Site. In addition, the selected alternative is protective of human health and the environment, will attain all federal and state ARARs, is cost-effective and utilizes permanent solutions to the maximum extent practicable. At the completion of this remedy, the residual risk associated with this Site will fall within the acceptable range mandated by CERCLA and the NCP of 10^{-6} to 10^{-4} which is determined to be protective of human health. The unacceptable level of risk posed to environmental receptors also will be adequately addressed. The estimated present worth cost of Alternative 3 is $ 2.5 million.

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementation of the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

9.1 Source Control

9.1.1 Major Components of Source Control

The major components of source control in the selected remedy (Alternative 3) include:

- Implement institutional controls (i.e., fencing and deed restrictions);
- Demolish tank farm pads east of the liquid processing building and dispose of the debris offsite (the tanks may be recycled);

- Excavate material from former sulfur pit and dispose of offsite;
- Neutralize soils in-place if located in areas where sulfur is present but inaccessible;
- Excavate contaminated surface soils and sediments (0-2 feet) above soil RGs;
- Biologically treat contaminated surface soils and sediments; and
- Place treated soils back onsite.

9.1.2 Performance Standards

The performance standards for soil and sediment remediation are based on protection of human health, and are listed in Table 7-1.

9.2 <u>Ground Water Remediation</u>

9.2.1 Major Components of Ground Water Remediation

The major components of the ground water remediation portion of the selected remedy (Alternative 3) are as follows:

- Extract contaminated ground water;
- Treat contaminated ground water to meet surface water discharge standards;
- Discharge treated ground water to onsite ponds or to the Tampa Bypass Canal under an NPDES permit; and
- Place controls on Site to restrict use of ground water beneath the Site through the filing of deed notices in order to limit exposure to contaminated ground water until RGs are met.

Remediation of the Floridan aquifer may be necessary, depending on the results of monitoring. Further delineation of contaminants in the Floridan aquifer will be required as part of this monitoring effort. If an additional ground water action is required to remediate the Floridan aquifer, this decision document may require modification.

9.2.2 Performance Standards

9.2.2.1 Extraction Standards

Ground water will be extracted from the surficial aquifer at a rate to be determined during remedial design.

9.2.2.2 Treatment Standards

Ground water will be monitored in the Floridan and surficial aquifer until the maximum concentration levels for ground water in Table 7-1 are attained. EPA considers the site-specific remediation goals in Table 7-1 to be protective of human health and the environment as they fall within EPA's risk range and are based on an EPA approved site-specific risk assessment. However, on June 2, 1994, FDEP issued guidance suggesting minimum criteria for ground water which are more stringent than the selected remediation goal for 4,4-DDT. Attainment of a more stringent level may be necessary to obtain FDEP's concurrence with deletion of this Site from the National Priorities List in the future.

9.2.2.3 Discharge Standards

Discharges from the ground water treatment system shall comply with all ARARs, including, but not limited to, substantive requirements of the NPDES permitting program under the Clean Water Act, 33 U.S.C. § 1251 et seq., and all effluent limits established by EPA in Table 7-2.

9.2.2.4 Design Standards

The design, construction and operation of the ground water treatment system shall be conducted in accordance with all ARARs, including the RCRA requirements set forth in 40 C.F.R. Part 264 (Subpart F).

9.3 Compliance Testing

Ground water monitoring shall be conducted at this Site. Ground water shall be sampled from existing and new monitoring wells, as determined during remedial design. After demonstration of compliance with Performance Standards, the Site shall be monitored for five years. If monitoring indicates that the Performance Standards set forth in Paragraph 9.2.2.2 are being exceeded at any time after pumping has been discontinued, extraction and treatment of the ground water will recommence until the Performance Standards once again are achieved. If monitoring of the surface water indicates contaminant levels are not decreasing, the effectiveness of the source control component will be re-evaluated.

Compliance testing of the residual soils that have been subjected to treatment will also be performed, to insure compliance with the requirements established as performance standards for the soil treatment technology.

9.4 Contingency Remedy

Should treatability studies demonstrate that the selected remedy described above (biological treatment), cannot achieve performance standards established for the Site soils, the treatment technology used for soil remediation at the Site will be low temperature thermal desorption (LTTD) in lieu of biological treatment. LTTD has been used successfully at other NPL sites with similar soil contaminants and levels of contamination, and therefore can be expected to satisfactorily achieve performance standards at this Site.

Using this technology, contaminated soils exceeding performance standards would be treated on-site by means of low temperature thermal desorption (LTTD). This process involves processing contaminated soils through a rotary dryer or kiln. The soil mass is heated to a temperature level that is sufficient to drive the contaminants off of the soil matrix, but not high enough to actually incinerate or destroy the contaminants. Soil contaminants are volatilized from the solids and purged from the kiln or dryer by means of an inert purge gas. After the purge gas leaves the desorption unit, it is treated by an off-gas treatment system that prevents the soil contaminants from being released into the environment. Typical air pollution control equipment (such as cyclonic precipitators and baghouses) also are used to protect air quality during operation of desorption units.

Numerous vendors for this type of treatment system exist, and EPA has experienced good success with its use on soils contaminated with pesticides at other Superfund sites. Treatability studies would likewise be necessary in order to assess the suitability of this technology for application at the Helena Chemical Site. The performance standard for this treatment system would likewise be the LDRs for site specific contaminants.

10.0 STATUTORY DETERMINATION

Under Section 121 of CERCLA, 42 U.S.C. § 9621, EPA must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

10.1 Protection of Human Health and the Environment

The selected remedy provides protection of human health and the environment by eliminating, reducing, and controlling risk through engineering controls and/or institutional controls and soil/sediment and ground water treatment as delineated through the performance standards described in Section 9.0 - SUMMARY OF SELECTED REMEDY. The residual risk due to individual contaminants will be reduced to a probability of $1x10^{-6}$ for carcinogens and a HQ of 1 for non-carcinogens. The residual carcinogenic risk at the Site, which is the sum of individual carcinogenic risks, will be reduced to acceptable levels (i.e., cancer risk between $1x10^{-6}$ and $1x10^{-4}$) once performance standards are achieved. Implementation of this remedy will not pose unacceptable short-term risks or cross media impact.

10.2 Attainment of the Applicable or Relevant and Appropriate Requirements (ARARs)

Remedial actions performed under Section 121 of CERCLA, 42 U.S.C. § 9621, must comply with all applicable or relevant and appropriate requirements (ARARs). All alternatives considered for the Site were evaluated on the basis of the degree to which they complied with these requirements. The selected remedy was found to meet ARARs identified in Tables 8-1, 8-2, and 8-3. The following is a short narrative explaining the attainment of pertinent ARARs.

Chemical-Specific ARARs
Performance standards are consistent with ARARs identified in Table 8-3.

Action-Specific ARARs
Performance standards are consistent with ARARs identified in Table 8-2.

Location-Specific ARARs
Performance standards are consistent with ARARs identified in Table 8-1.

The selected remedy is protective of species listed as endangered or threatened under the Endangered Species Act. Requirements of the Interagency Section 7 Consultation Process, 50 CFR Part 402, will be met. The Department of the Interior, Fish & Wildlife Service, will be consulted during the remedial design to assure that endangered or threatened species are not adversely impacted by implementation of this remedy.

Waivers
Waivers are not anticipated at this Site at this time.

Other Guidance To Be Considered
Other Guidance To Be Considered (TBCs) include health-based advisories and

guidance. TBCs have been utilized in estimating incremental cancer risk numbers for remedial activities at the Site and in determining RCRA applications to contaminated media.

10.3 Cost Effectiveness

After evaluating all of the alternatives which satisfy the two threshold criteria, protection of human health and the environment and attainment of ARARs, EPA has concluded that the selected remedy, Alternative 3, affords the highest level of overall effectiveness proportional to its cost. Section 300.430(f)(1)(ii)(D) of the NCP also requires EPA to evaluate three out of five balancing criteria to determine overall effectiveness: long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost-effective. The selected remedy provides for overall effectiveness in proportion to its cost.

The selected remedy has a relatively high present worth, capital, and operation and maintenance cost compared to other remedies, but best satisfies the criteria for long-term effectiveness and permanence and short-term effectiveness. This alternative will reduce toxicity, mobility, or volume through treatment.

The estimated present worth costs for the selected remedy is $ 2.5 million.

10.4 Utilization of Permanent Solutions to the Maximum Extent Practicable

EPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the final remediation at the HCC Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that Alternative 3 provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element and consideration of state and community acceptance.

10.5 Preference for Treatment as a Principal Element

The statutory preference for treatment is satisfied by the selected remedy.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The remedy described in this Record of Decision is the preferred alternative described in the Proposed Plan for this Site. There have been several small changes in the information presented in the Proposed Plan:

1. The remedial goals in ground water for Endosulfan I and II in the Proposed Plan are 0.2 ug/L and 0.2 ug/L, and are incorrect. The remedial goals in ground water for Endosulfan I and II in the ROD (Table 7-1) are 2 ug/L and 2 ug/L. The remedial goals in the ROD represent concentrations required to yield a HQ of 1.

2. The present worth cost of Alternative 5 in the Proposed Plan is $ 6,500,000. The present worth cost of Alternative 5 in the ROD ranges from $ 3,659,000 to $ 5,311,000. The cost in the Proposed Plan was incorrect.

3. The present worth cost of Alternative 6 in the Proposed Plan is $ 5,800,000. The present worth cost of Alternative 6 in the ROD ranges from $ 3,111,000 to $ 4,763,000. The cost in the Proposed Plan was incorrect.

APPENDIX A

RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY
HELENA CHEMICAL COMPANY SUPERFUND SITE
TAMPA, HILLSBOROUGH COUNTY, FLORIDA

Introduction

This responsiveness summary for the Helena Chemical Company Superfund Site documents for the public record concerns and issues raised during the comment period on the proposed plan. EPA's responses to these concerns and issues are included.

Overview of Comment Period

The proposed plan for the Helena Chemical Company Superfund Site was issued on July 18, 1995. A sixty-day public comment period for the proposed plan began July 20, 1995, and ended September 23, 1995. Two written comments with multiple concerns were received during that comment period. A public meeting was held on July 27, 1995, at the Kenley Park Recreation Center at 1301 North 66th Street, Tampa, Florida. Many comments were received and addressed during that meeting. A transcript of the meeting was prepared and is available at the information repository near the Site.

Concerns Raised During the Comment Period

Private Well User Concerns:

1. One commentor asked if EPA plans to test private wells near the Site. The commentor asked when EPA was going to take some action to help "everybody", in particular the private well users in the area of the Site. The commentor noted the large number of hazardous sites located in the area.

   Response: A well survey was conducted as part of the RI/FS for the Helena Chemical Company Site. The results of the well survey indicate that only monitoring wells are open to the surficial aquifer; drinking water wells around the Site are open to the Floridan Aquifer. Ground water contamination at the Site is primarily located in the surficial aquifer. Minor amounts of contamination have been detected in the Floridan Aquifer beneath the Site.

   Private wells were not sampled during the RI/FS; contaminated ground water in the surficial aquifer, from the HCC Site, discharges to the Tampa Bypass Canal and does not extend to any private wells. If the contamination migrates to an area where private wells exist, EPA will require that the private wells be monitored to ensure that human health is protected.

   EPA does not have the authority or funds to address all local ground water issues. Local water quality is generally considered to be under the jurisdiction of local government. If contamination from a Superfund Site affects the water quality in a private well, EPA can require that the responsible parties provide an alternate drinking water source to the well users. However, EPA's Superfund program cannot provide public water supplies to well users just because of the number of hazardous waste sites in the area.

EPA recommends that the commentor work with the county and state health departments to determine if privates wells might be affected by sites upgradient from the wells. The health department may also agree to test a well and determine if alternate water sources are available.

Concerns Related to Past Exposures:

2. One commentor questioned why EPA is proposing to remediate the Site now when residents have already moved out and the area is industrial. The commentor wanted to know what was going to be done to help former residents and address their past exposure.

   Response: EPA is proposing to remediate the Site in order to protect current and future onsite workers and to protect the Floridan aquifer from contaminated ground water. EPA wants to prevent current and future exposure at the Site. The Agency for Toxic Substances and Disease Registry (ATSDR) and the State of Florida Department of Health and Rehabilitative Services (HRS) should be contacted to address past exposure issues. ATSDR and HRS can perform surveys and studies to track public health concerns and determine if they can be linked to discharges from a particular facility.

Concerns about the Remedial Investigation/Feasibility Study:

3. One commentor suggested that the RI/FS did not consider past drainage paths or investigate fully those paths. The commentor suggested that EPA investigate further downstream in McKay Bay since most of the contamination in adjacent drainage ways may have been removed when the Tampa Bypass Canal was constructed. The commentor suggested that more sources are likely present than those identified in the RI/FS.

   Response: EPA's investigations typically begin onsite and are extended offsite if data indicates that contamination has migrated offsite. Since the Tampa Bypass Canal was constructed in the early 1970s, contamination that may have migrated to the old Six Mile Creek was probably removed or covered with fill. Since numerous facilities discharge water to McKay Bay, there is no direct pathway to link contamination at the Site to contamination in McKay Bay. An investigation and clean up of McKay Bay may be pursued by another agency in a separate action, but it will not be investigated further as part of the SMC Site.

A review of the RI/FS will reveal that EPA and SMC have attempted to identify all possible sources of contamination at the Site. Since ground water remediation is dependent on source removal to be effective, it should be evident during the course of cleanup if additional sources are present. If additional sources of ground water contamination are discovered during the course of remediation, the sources will be removed and treated.

4. One commentor asked EPA to explain bioremediation.

Response: Bioremediation is a method of treating contaminated material by means biological processes. Biological treatment of hazardous organic substances (bioremediation) is based on the use of either aerobic or anaerobic bacteria. Aerobic biodegradation is accomplished in the presence of oxygen and is particularly effective on aromatic hydrocarbons (VOCs and petroleum-based compounds). Anaerobic biodegradation is carried out in an oxygen-free environment and has been shown to degrade chlorinated compounds such as pesticides and herbicides. Success depends on using microorganisms well-acclimated to the specific waste type and having sufficient nutrients available.

5. One commentor asked EPA to explain the difference between thermal desorption and incineration.

Response: Low Temperature Thermal Desorption (LTTD) is a treatment process in which contaminated soil/sediment is excavated and placed in a heat exchanger (thermal processor) with temperatures much lower (<1000°F) than those achieved by incineration (>2000°F). Air emissions from LTTD are less costly to deal with than for incineration. LTTD leaves the soil intact and vaporizes the pesticides, whereas incineration leaves ash that must be disposed of in accordance with regulatory requirements.

6. One commentor asked if bioremediation has been used successfully at other Sites.

Response: No, not yet. However, bioremediation of pesticide contaminated soil is considered an innovative technology and is currently being considered for use at several Sites in EPA Region IV. At least two different companies are developing the technology. Results are not yet available to demonstrate complete success at other sites.

7. One commentor asked EPA what the difference was in the timeframe to remediate contamination using bioremediation versus doing nothing.

Response: Bioremediation of contaminated soils is expected to take four years at the SMC Site. The timeframe required for natural degradation/attenuation of contaminants in soil has not been determined. Pesticide levels in soils are expected to remain at current levels indefinitely unless remediated.

8. One commentor asked why air sparging was not considered if oxygen levels were important to bioremediation.

Response: It is possible that air sparging might be used in the remediation process if oxygen is needed to induce bioremediation. This will be determined in remedial design. Air sparging is not adequate as a stand alone process for remediation of pesticides.

9. One commentor asked how far south of the Helena site contamination was located.

Response: Soil contamination was found on the CSX railroad easement south of the Site and on the property south of CSX railroad. Ground water contamination was determined to extend approximately 200 ft south of the Site under several adjacent properties, including the SMC Site.

10. One commentor wanted to know the total volume of contaminated soil.

Response: Exact volumes based on the clean up levels proposed by EPA are not available. Based on earlier cleanup level assumptions, the responsible parties estimate that approximately 9,600 cubic yards of material would require excavation and treatment. The volumes now are expected to be slightly higher due to the lower clean up standards proposed by EPA.

11. One commentor asked to which surface water body treated ground water will be discharged to in Alternative 3. The commentor asked if a National Pollution Discharge Elimination System (NPDES) Permit will be required for the discharge.

Response: Helena Chemical Company currently has a NPDES permit to discharge process water to the Tampa Bypass Canal. The existing permit would have to be modified for discharge of additional effluent.

12. One commentor asked what timeframe is required to remediate soils and ground water to the proposed cleanup goals in Alternative 3.

Response: Soil remediation timeframe cannot be determined until pilot study has been performed. If the timeframe is excessive, costs will increase and it will likely be more appropriate to use LTTD to treat soils. Ground water remediation is estimated at over 30 years.

Concerns about the Baseline Risk Assessment:

13. One commentor asked what studies show is a safe amount of time (hours) to be in the general area.

    Response: There is no limit to the amount of time that it is safe to be in the general area near the Site. The risk from the Site is relevant only to a person or persons who are onsite for a long period of time (long-term exposure). EPA's risk evaluation is based on an onsite worker being exposed 8 hours per day, 5 days per week, and 50 weeks per year for 25 years. Current workers should be monitored for health effects.

14. One commentor asked if pesticides could have bioaccumulated in vegetables, cattle, etc., grown on soil contaminated in the 1950s or 1960s.

    Response: Pesticides can bioaccumulate in the food chain. Therefore, it is possible that biota and wildlife at the Site have bioaccumulated pesticides.

15. One commentor asked how many years a person would have to be exposed to contaminated ground water or soils to develop cancer or non-carcinogenic effects?

    Response: Toxicologist are divided on the length of exposure required to cause cancer. Typically one exposure to a carcinogen EPA's risk assessment evaluates the probability that a dose will cause cancer during the lifetime of the exposed individual. It should be noted that each person has a one in four chance of developing cancer in his/her lifetime. If 10,000 onsite workers are exposed to site contaminants at current concentrations, two additional incidents of cancer are expected to occur.

16. One commentor asked if property owners south of the Helena Site have been made aware that sulfur and other pesticides may have flowed in drainage structures to their properties in the past.

    Response: Property owners have been made aware that the SMC Site and the Helena Chemical Company Site are being remediated. They have been made aware of the results of the investigations through pubic fact sheets. They have been made aware that detailed information is available at the information repository near the sites.

Concerns About The Proposed Remedy:

17. One commentor asked if the monitoring well network would be expanded to areas that he indicted may be a continuing source.

Response: The monitoring well network will be expanded as necessary to ensure that the extent on contamination is known and is being controlled to protect human health and the environment. The current network is adequate to define contamination in the surficial aquifer; as contaminants migrate, the network will have to be expanded. Contamination levels in the Floridan aquifer need to be monitored and contamination in the Floridan aquifer needs further delineation to ensure public health is protected.

18. One commentor asked why EPA would select a remedy (such as thermal desorption) which could make contaminants airborne.

    Response: EPA will require that adequate engineering controls are in place to ensure that workers and the surrounding community are protected during the execution of any remedy at a Site. EPA will only select a remedy if it reduces the overall risk to human health and the environment. If the remedy itself were to increase the risk, EPA would not agree to execution of the remedy.

19. One commentor asked when excavation of soils would begin at the Site and if people who live or work around the Site should leave the area when the excavation is being done.

    Response: Excavation of soils will not begin until the remedial design is complete (at least 18 to 24 months from approval of the ROD). Engineering controls will be utilized to ensure no hazardous conditions exist for those who live and work near the Site. There will be no need for people who line or work near the Site to leave the area during performance of work at the Site.

20. One commentor asked if the PRPs have selected a consultant to do the remediation.

    Response: EPA is not aware of any consultants selected by the PRPs for performance of the work.

21. On commentor asked if Helena and Stauffer PRPs are working together, since contaminants and remedies are similar.

    Response: EPA understands that the Helena and Stauffer PRPs have met on occasion, but no agreement has been reached to work together to remediate these sites.

22. One commentor asked if pesticide odors and emissions are expected during excavation, and if so what measures will be taken to protect the health of onsite workers and people surrounding the Site.

    Response: Odor problems were experienced at an adjacent facility during excavation of pesticide contaminated soil; therefore, it is reasonable to expect that odor problems need to be consider likely at this Site. EPA will ensure that odor problems are anticipated and dealt with promptly during excavation. EPA will require that reasonable air emissions controls are installed.

23. One commentor suggested that a ground water capture analysis be completed to demonstrate that a contaminated water plume is fully captured, prior to implementing final design of the ground water treatment recovery system.

    Response: An analysis will be performed during remedial design to estimate the extraction system required to ensure plume capture.

24. One commentor suggested that EPA require monitoring of the Floridan aquifer or set performance standards that would trigger the requirement to remediate the Floridan aquifer if the standards are exceeded.

    Response: The proposed remedy requires monitoring of the Floridan aquifer. The need to remediate the Floridan aquifer will be evaluated if monitoring results demonstrate that additional ground water actions are necessary.

25. One commentor suggested that the use of the 20 parts per billion (ppb) Florida Secondary Maximum Contaminant Level (SMCL) for xylene as a performance standard is needlessly restrictive. The commentor noted that 10 parts per million (ppm) is the primary drinking water standard set by EPA and the State of Florida and is considered protective of public health for all public drinking water systems in the State of Florida. The commentor also noted that the 20 ppb secondary standard is based on odor and the aesthetic quality of the water, and that the surficial aquifer is not likely to be used as a drinking water source due to the low volumes it would produce, especially when access to the higher quality, higher yielding Floridan aquifer is so readily available.

    Response: The 20 ppb Florida SMCL was proposed as a cleanup goal to ensure that xylene would not be available in ground water to transport any residual pesticides that might be lingering in soil.

26. One commentor asked EPA to set a cleanup goal of 50 mg/kg of total chlorinated pesticides in the soil rather than setting cleanup goals for 9 individual compounds.

    Response: EPA has determined that it would be more appropriate to set cleanup goals for individual contaminants so that when cleanup is complete, no pesticide will be present above their appropriate risk level. If total pesticides is used as a cleanup goal, the performance standard at Helena would have to be set at the lowest standard determined acceptable for the 9 pesticides of concern (Toxaphene @ 2.8 ppm). This level may be unnecessarily stringent for the other pesticides at the Site.

27. One commentor requested that EPA retain a contingency in the ROD to excavate and ship contaminated soils to an offsite, regulated and permitted hazardous waste incinerator, in addition to the low temperature thermal desorption (LTTD) contingency remedy.

Response: Offsite disposal of contaminated soils was considered in the FS, but was dropped in the analysis because the cost was determined to be prohibitive by the PRP and EPA. Offsite disposal was not carried through the FS or the Proposed Plan, and therefore, cannot be included in the ROD. If offsite disposal is latter determined to be appropriate for this Site, a ROD amendment will have to be approved.

28. One commentor noted that a an inaccurate statement is made in paragraph 2 on page 4. The statement that the primary contaminants of concern include metals is inaccurate; metals are not included in the list of contaminants of concern in the proposed plan.

Response: The comment is noted. Several metals were detected in ground water at concentrations that exceed drinking water standards. EPA considers pH of soils in the former sulfur pit at the site as the source for the release of metals to ground water. For that reason, EPA required that the pH of soils be stabilized between 6.5 and 8.5 in the Proposed Plan and the ROD, rather than setting cleanup goals for individual metals. If stabilizing the pH is not effective at reducing the concentration of metals in ground water, cleanup goals that address specific metals may be required.

29. One commentor questioned the cleanup goal in the proposed plan for Endosulfan I and II of 0.2 ppb, since the Florida guidance concentration is 0.35 ppb.

Response: The cleanup goal for Endosulfan I and II was presented incorrectly in the proposed plan; the cleanup goal for Endosulfan I and II should have been 2 ppb. This error has been corrected in the ROD and is explained in Section 11 of the ROD. The cleanup goal in the ROD is a health based goal generated based on specifics of the Site. The Florida guidance concentration is not a Site-specific number.

30. One commentor stated that the cost of Alternative 5 should be 3.6 to 5.3 million dollars versus $6.5 million as reported in the proposed plan. The commentor also stated that the cost of Alternative 6 should be 4.3 to 6.6 million versus $5.8 million as reported in the proposed plan.

Response: The commentor is correct regarding the cost of Alternative 5; the error is noted in Section 11 of the ROD. The commentor and the Proposed Plan are both in error regarding the cost of Alternative 6. The commentor notes costs which reflect excavation of contaminated soil to a depth of 4 feet, treatment with LTTD, and natural attenuation of ground water contamination. The proposed remedy only requires excavation of contaminated soil to a depth of 2 feet, treatment with LTTD, and natural attenuation of ground water contamination. The cost of Alternative 5 should be 3.1 to 4.8 million dollars. The error is noted in Section 11 of the ROD.

31. One commentor objected to a statement in the proposed plan that contaminants would migrate downgradient in the Floridan aquifer. The commentor noted that the RI/FS did not establish that any contaminants are migrating through the confining layer at the HCC site. The commentor suggested that the low levels of pesticides found in the Floridan aquifer monitoring wells are more likely the result of well installation artifacts rather than actual contamination within the aquifer. The commentor recommended that EPA retain natural attenuation as a contingency ground water remedy in the ROD.

    Response: The comment is noted. The proposed remedy, Alternative 3, requires that the surficial aquifer ground water be extracted and treated and that the Floridan aquifer ground water be monitored. If natural attenuation is demonstrated to be effective during remedial design, a ROD amendment will have to be approved.

Concerns From Adjacent Property Owner:

32. One commentor stated that an acceptable site access lease with compensation will be required from Helena prior to access or work being conducted on adjacent property.

    Response: If the remedial action prevents the current owner from conducting work, then compensation may be appropriate. However, ground water extraction systems are typically constructed below grade and only result in temporary access being required during construction and to maintain and sample the system.

33. One commentor asked that EPA require Helena Chemical Company to remove and dispose of drill cuttings remaining from a well installation project performed by an adjacent property owner. The commentor stressed that the wells were installed to protect the adjacent property owner from liability at the Site and that Helena Chemical Company and EPA sampled the wells and used the results in the RI/FS.

    Response: EPA does not have the authority to require Helena Chemical to dispose of materials generated during the investigation conducted by another party, even if the expense of disposal is necessary because of contamination cause by Helena Chemical Company. The adjacent property owner may pursue recovery of costs through an independent legal action, if desired.

34. One commentor asked that EPA require Helena Chemical Company to reimburse the adjacent property owner for the license access agreement with CSX required to install monitoring wells on the CSX right-of-way. The commentor stressed that the wells were installed to protect the adjacent property owner from liability at the Site and that Helena Chemical Company and EPA sampled the wells and used the results in the RI/FS.

Response: EPA does not have the authority to recover losses incurred by property owners adjacent to Superfund Sites. The adjacent property owner may pursue recovery of costs through an independent legal action, if desired.